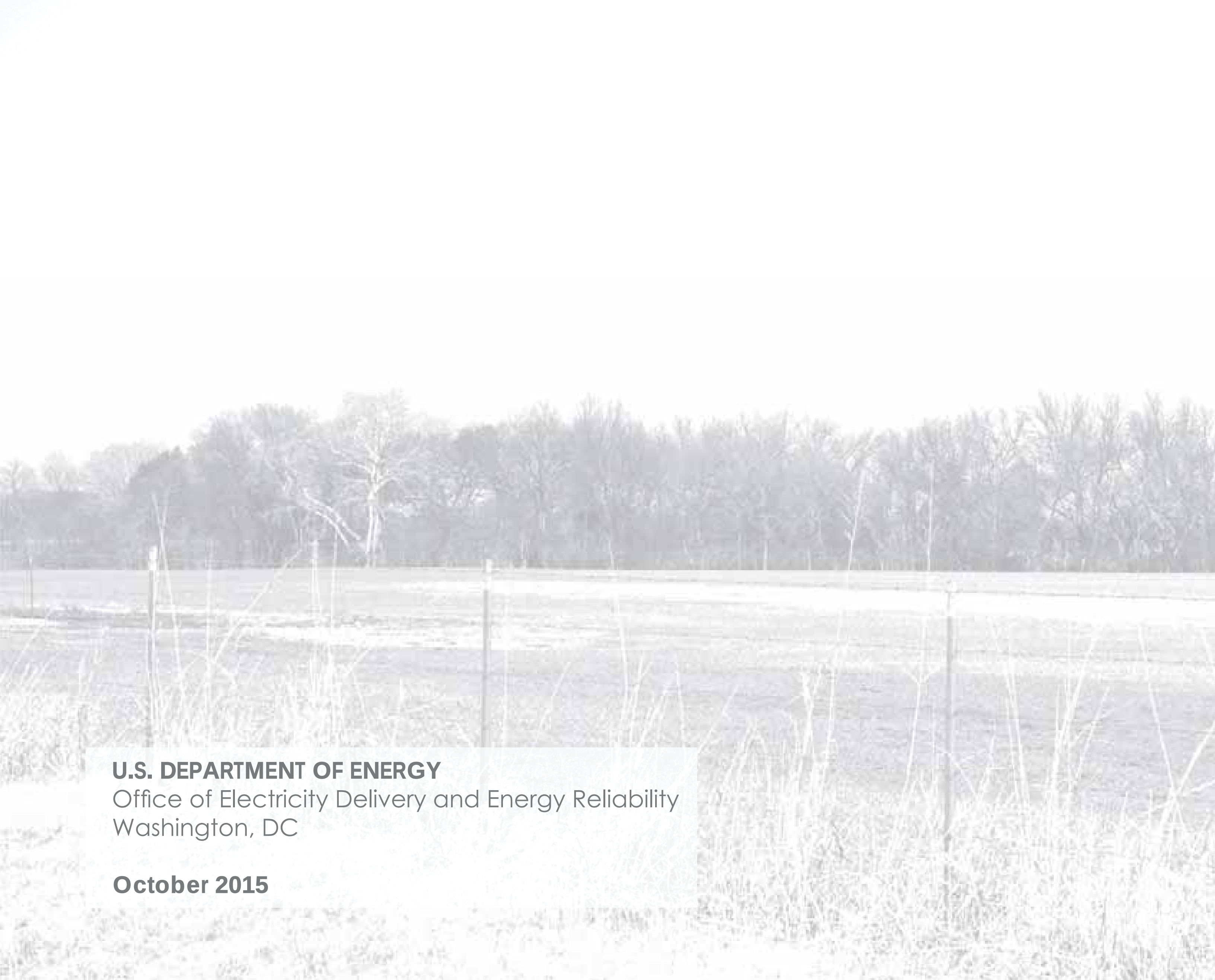
DOE/EIS-0486

Final

PLAINS & EASTERN CLEAN LINE TRANSMISSION PROJECT

ENVIRONMENTAL IMPACT STATEMENT

Volume VI of VIII



U.S. DEPARTMENT OF ENERGY
Office of Electricity Delivery and Energy Reliability
Washington, DC

October 2015

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APPENDIX M

ROUTE VARIATIONS

M.1 Route Variation Development Process

The U.S. Department of Energy (DOE) issued the Draft Environmental Impact Statement (EIS) for public comment with a Notice of Availability in the *Federal Register* on December 17, 2014 (79 FR 75132). DOE held 15 public hearings in Oklahoma, Texas, Arkansas, and Tennessee from January 26, 2015, to February 19, 2015. During the public comment process on the Draft EIS, DOE received numerous comments, some providing new information not known at the time of the Draft EIS and some requesting re-routing of the Applicant Proposed Route. DOE did not receive specific route variation requests for the high-voltage direct current (HVDC) alternative routes. These public comments included Clean Line's comment letter that conveyed the outcome of their communications with landowners and information gathered in 2014 and 2015. The comment period ended on April 20, 2015.

For each comment that specifically requested a re-routing consideration, DOE reviewed the information supplied with the comment and coordinated with Clean Line through a series of formal data requests. For each comment that provided information indicating a potential conflict between a route and resources not known at the time of the Draft EIS, DOE reviewed the comment and related data request responses from Clean Line, and determined the feasibility of developing route variations[1] to avoid those areas (e.g., previously unknown residences or structures, environmentally or culturally sensitive areas). In each instance, any consideration of a route variation needed to remain consistent with the routing criteria used for route development. These criteria and a description of the route development process are included in Appendix G of this EIS. For each of the data requests submitted to Clean Line by DOE, Clean Line prepared responses detailing whether avoidance or re-routing was technically feasible. For those requests that were technically feasible, Clean Line stated either (a) if adjustments to the representative right-of-way (ROW) within the existing 1,000-foot-wide corridor could avoid the resource of concern (referred to as micrositing), or (b) how Clean Line identified and developed a route variation outside of the 1,000-foot-wide corridor.

Clean Line submitted geographic information systems (GIS) data to DOE showing the locations of the route variations, including how each endpoint of a route variation could be integrated into the Applicant Proposed Route. The GIS data identified minor modifications to HVDC route alternatives that would be necessary to connect to route variations.

DOE reviewed the individual public comments, evaluated the information provided by Clean Line, and conducted an independent verification. DOE independently evaluated and verified GIS data and locational information provided by Clean Line for each route variation. During this process, DOE sent specific questions to Clean Line (related to data sources, route details, and other information) and evaluated Clean Line's responses. DOE also conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and Southwestern Power Administration examined the routes for technical feasibility. DOE provided the summary of route variations to the Cooperating Agencies for their input. DOE evaluated criteria in

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1 Throughout this document and the Final EIS, the term "original Applicant Proposed Route" refers to the centerline of the representative ROW that was shown and analyzed in the Draft EIS. The term "route variation" refers to the centerline of the revised representative ROW, shown and analyzed in the Final EIS. With one exception, route variations involve changes to the centerline outside of the 1,000-foot-wide corridor that DOE analyzed in the Draft EIS. DOE included Applicant Proposed Route Link 5, Variation 1, which is within the 1,000-foot-wide corridor analyzed in the Draft EIS, as a route variation so that DOE's analyses of the representative ROW would be consistent with Clean Line's application for a Certificate of Public Convenience and Necessity with the Tennessee Regulatory Authority.

evaluating each route variation, including technical feasibility, potential impacts, and location relative to the 1,000-foot-wide corridor and representative ROW analyzed in the Draft EIS. After completing these evaluations, DOE chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS. In total, DOE analyzed 23 route variations in this Final EIS. In one case, DOE chose to carry forward both the route variation and the original corresponding segment of the Applicant Proposed Route for analysis in the Final EIS.

Since these route variations caused a shift in the Applicant Proposed Route, there were four instances where the change in the Applicant Proposed Route caused a discontinuity in the connection between the Applicant Proposed Route and the HVDC alternative routes. As a result of the route variations, DOE and Clean Line developed "alternative route adjustments" to re-establish the continuity between the Applicant Proposed Route and the HVDC alternative routes. These occurred in Regions 3, 5, and 6.

DOE has evaluated these route variations both individually and collectively and has concluded that they do not constitute substantial changes in the Proposed Action or significant new circumstances or information relevant to environmental concerns. The environmental impacts of the route variations are analyzed and disclosed in the Final EIS.

M.2 Route Variations

This appendix includes details about the route variations that have been adopted for consideration in the Final EIS. Table M.2-1 provides a list of the route variations analyzed in the Final EIS (and any required route adjustments), the affected counties where those route variations are located, and whether the route variation replaces the corresponding segment of the Applicant Proposed Route or if the variation is carried forward in the Final EIS analysis in addition to the Applicant Proposed Route.

Table M.2-1:
Counties Potentially Affected by the Applicant Proposed Route - Route Variations

Region	APR Variation	HVDC Alternative Route Adjustment	Counties Potentially Affected	Notes
1	None			
2	Applicant Proposed Route Link 1, Variation 1		Woodward, OK	Replaces portion of the APR
	Applicant Proposed Route Link 2, Variation 2		Major, OK	Replaces portion of the APR
3	Applicant Proposed Route Link 1, Variation 2		Payne, OK	Replaces portion of the APR
	Applicant Proposed Route Links 1 and 2, Variation 1	3-A	Payne, OK	Replaces portion of the APR
	Applicant Proposed Route Link 4, Variation 1		Lincoln, OK	Replaces portion of the APR
	Applicant Proposed Route Link 4, Variation 2		Creek, OK	Replaces portion of the APR
	Applicant Proposed Route Link 5, Variation 2		Muskogee, OK	Replaces portion of the APR

Table M.2-1:
Counties Potentially Affected by the Applicant Proposed Route - Route Variations

Region	APR Variation	HVDC Alternative Route Adjustment	Counties Potentially Affected	Notes
4	Applicant Proposed Route Link 3, Variation 1		Sequoyah, OK	Replaces portion of the APR
	Applicant Proposed Route Link 3, Variation 2		Sequoyah, OK	Analyzed as a variation to the APR
	Applicant Proposed Route Link 3, Variation 3		Crawford, AR	Replaces portion of the APR
	Applicant Proposed Route Link 6, Variation 1		Crawford, AR	Replaces portion of the APR
	Applicant Proposed Route Link 6, Variation 2		Crawford, AR	Replaces portion of the APR
	Applicant Proposed Route Link 6, Variation 3		Crawford, AR	Replaces portion of the APR
	Applicant Proposed Route Link 9, Variation 1		Pope, AR	Replaces portion of the APR
5	Applicant Proposed Route Link 1, Variation 2		Pope, AR	Replaces portion of the APR
	Applicant Proposed Route Link 2, Variation 2		Pope, AR	Replaces portion of the APR
	Applicant Proposed Route Links 2 and 3, Variation 1	5-B	Pope, AR	Replaces portion of the APR
	Applicant Proposed Route Links 3 and 4, Variation 2	5-E	Van Buren and Faulkner, AR	Replaces portion of the APR
	Applicant Proposed Route Link 7, Variation 1		White, AR	Replaces portion of the APR
6	Applicant Proposed Route Link 2, Variation 1	6-A	Jackson, AR	Replaces portion of the APR
7	Applicant Proposed Route Link 1, Variation 1		Mississippi, AR	Replaces portion of the APR
	Applicant Proposed Route Link 1, Variation 2		Mississippi, AR and Tipton, TN	Replaces portion of the APR
	Applicant Proposed Route Link 5, Variation 1		Shelby and Tipton counties, TN	Replaces portion of the APR

The details associated with each of these route variations and associated alternative route adjustments can be found in the exhibits to this appendix. The following bullets provide a brief description of the materials in each exhibit:

- Exhibit 1, Route Variation Sheets—This exhibit provides detailed aerial maps of each route variation and alternative route adjustment from west to east. For most of the variations and alternative route adjustments, the maps include multiple sheets to provide the adequate level of detail to understand how the variation compares graphically with the original Applicant Proposed Route and original HVDC alternative route.
- Exhibit 2, 1,000-foot-wide Route Variation Tables—This exhibit presents environmental data associated with the 1,000-foot-wide corridor that generally forms the region of interest (ROI) for the affected environment (see Section 3.1 of the EIS). DOE generated and used these data to analyze potential differences in the affected

environment as compared to the information presented for each resource area in the Draft EIS. The first 23 entries provide data associated with the route variations included in the Final EIS. The last four entries are associated with the route adjustments of the HVDC alternative routes in Regions 3, 5, and 6. Information is provided for environmental parameters such as:

- Overview (length and acreage)
- Parcels and infrastructure
- Land cover
- Structure proximity
- Government jurisdictions
- Conservation easements
- Soils, geology, and topographical resources
- Biological resources
- Water resources
- Visual/cultural resources
- Aviation facilities
- Environmentally contaminated sites

- Exhibit 3, 200-foot-wide Route Variation Comparison Tables—This exhibit presents the environmental data for the 200-foot-wide representative ROW associated with the route variations. DOE generated and used these data in the analysis of potential impacts associated with the original Applicant Proposed Route, route variations, original HVDC alternative routes, and alternative route adjustments in the Final EIS. The types of data presented in this exhibit are the same as presented in Exhibit 2, as described above. The primary difference between Exhibits 2 and 3, besides the width of the analyzed corridor, is that Exhibit 3 presents a comparison of the data for the route variation (right column) next to that of the original Applicant Proposed Route associated with the variation (left column). This information reflects the change on these parameters from the route variation as compared to the original Applicant Proposed Route.
- Exhibit 4, Clean Line Route Variation Data Responses—This exhibit provides a collection of Clean Line's responses to DOE data requests that resulted in the development of route variations to the original Applicant Proposed Route. Clean Line provided additional information in response to DOE data requests, including maps and data, but the Final EIS relies on DOE's independent analyses of route variations, presented in Exhibits 1 to 3 of this Appendix M.

References

40 CFR 1502.9(c)(1). "Draft, final, and supplemental statements; Environmental Impact Statements." *Protection of Environment*. Council on Environmental Quality. <http://www.ecfr.gov/cgi-bin/text-idx?SID=de36b0f95e2a0b195bd67dc739f80f6a&mc=true&node=se40.33.1502_19&rgn=div8>. Accessed September 2, 2015.

79 FR 75132. "Plains & Eastern Clean Line Transmission Project Draft Environmental Impact Statement Notice of Availability and Public Hearing." December 17, 2014. <http://www.gpo.gov/fdsys/pkg/FR-2014-12-17/pdf/2014-29524.pdf#page=1>.

Exhibit 1, Route Variation Sheets

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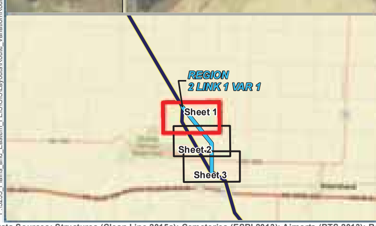

Plains & Eastern EIS

0 1,000 2,000 3,000 4,000 Feet

HVDC Applicant Proposed Route (APR)
Original APR

Comparison
APR Route Variation
1,000-ft Wide Corridor
DEIS HVDC 1,000-ft Wide Corridor

Transmission Lines
115kV; 138kV Transmission Line

Jurisdiction
State School Lands (owned or leased)

Note: Routes shown with representative lines not indicative of corridor or ROW widths

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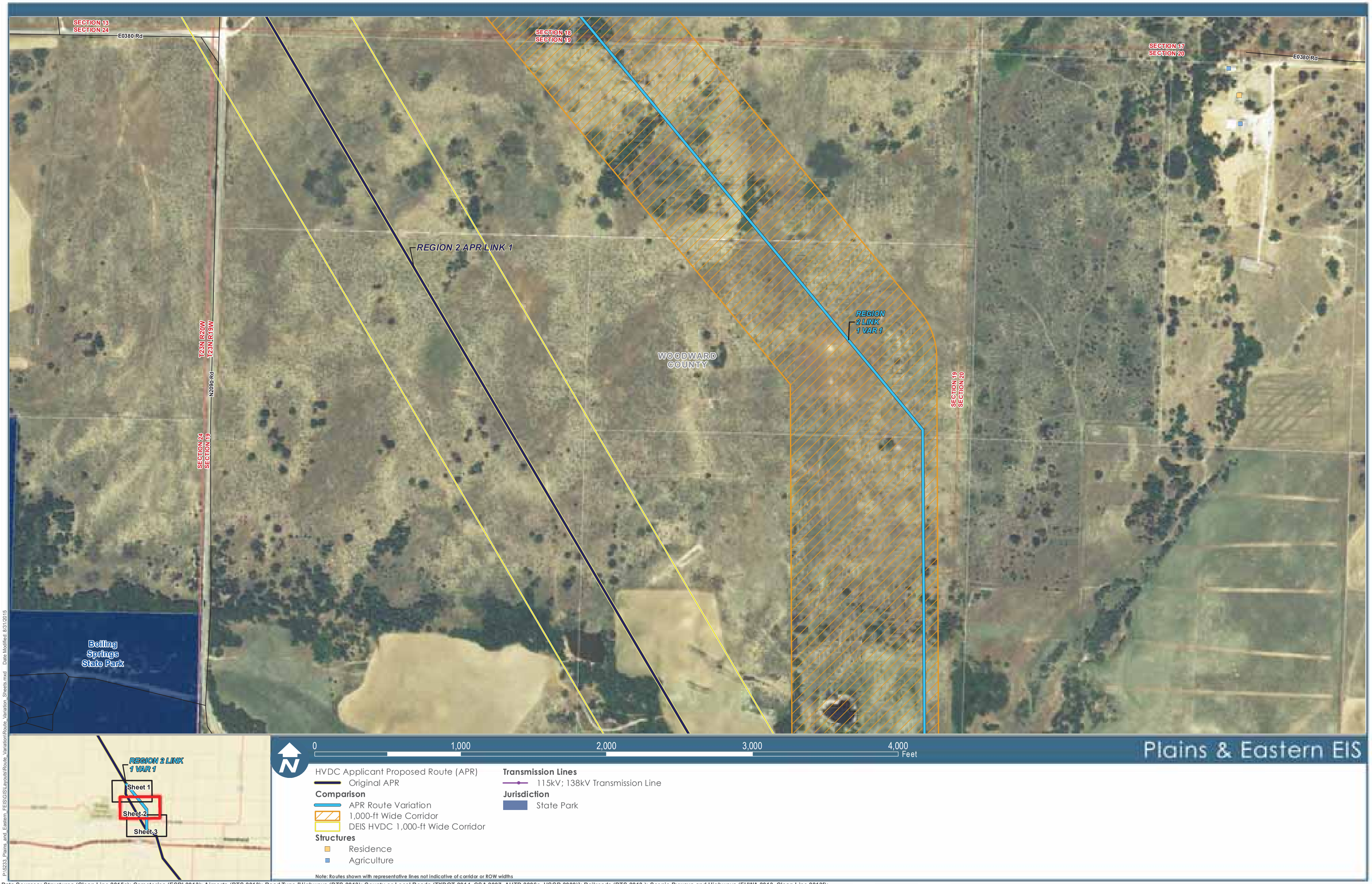
Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
*References have been provided for all data sources on the aerial maps. Not all data sources are contained within each region or on each map within a region.

Region 2 Link 1 Variation 1 Sheet 1



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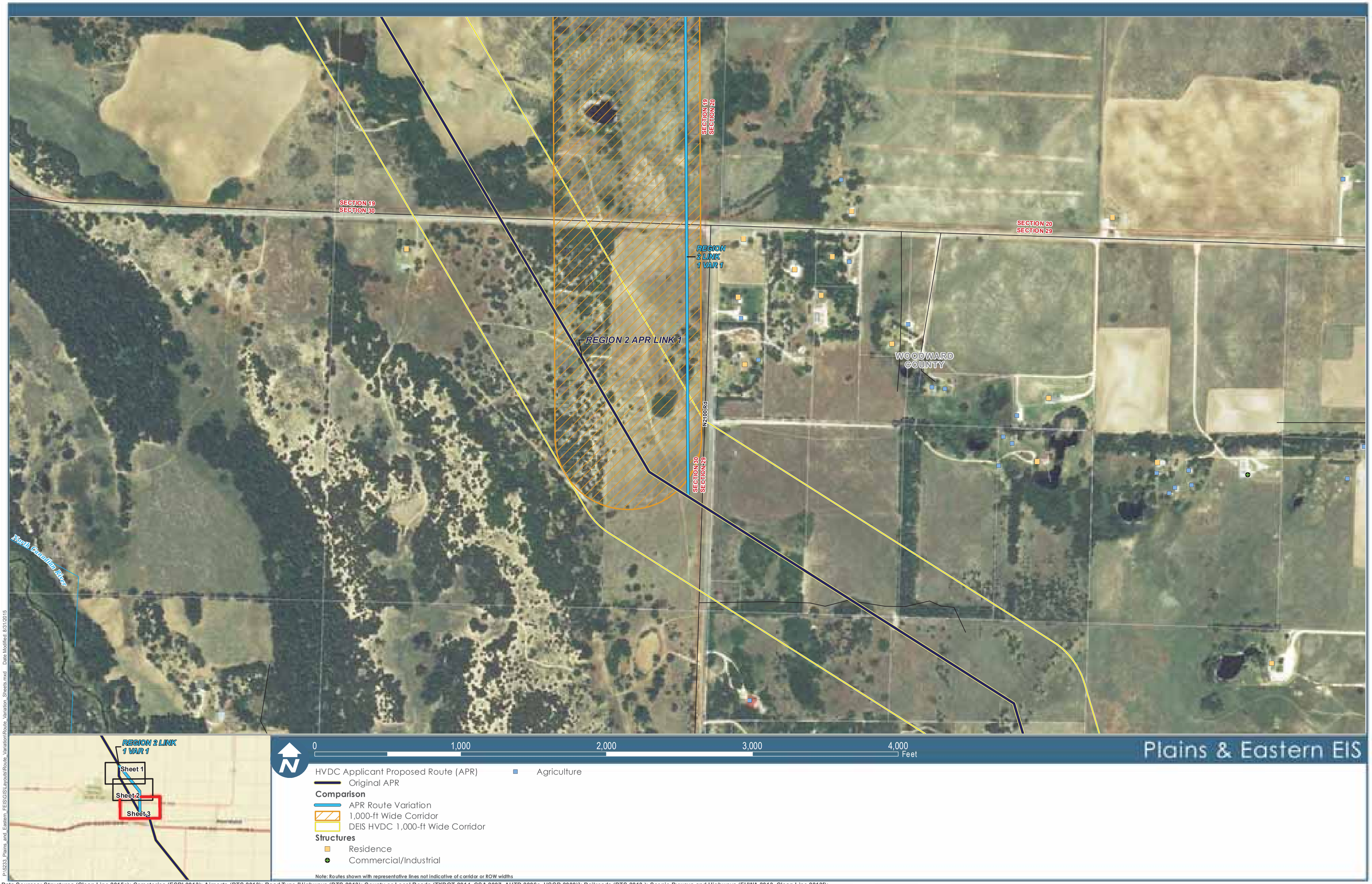
Region 2 Link 1 Variation 1 Sheet 2



Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
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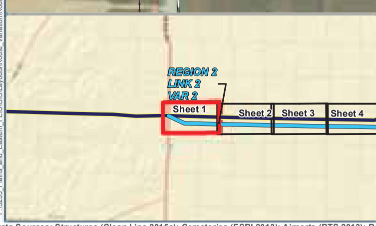
Region 2 Link 1 Variation 1 Sheet 3



0 1,000 2,000 3,000 4,000 Feet

Plains & Eastern EIS

HVDC Applicant Proposed Route (APR)
- Original APR

Comparison
- APR Route Variation
- 1,000-ft Wide Corridor
- DEIS HVDC 1,000-ft Wide Corridor

Structures
- Residence
- Agriculture

Oil and Gas Wells
- Oil and Gas Wells

Transmission Lines
- 69kV Transmission Line

Note: Routes shown with representative lines not indicative of corridor or ROW widths

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Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
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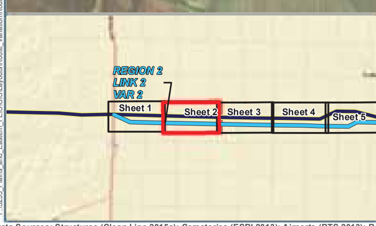
Region 2 Link 2 Variation 2 Sheet 1



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Plains & Eastern EIS

HVDC Applicant Proposed Route (APR)
Original APR

Comparison
APR Route Variation
1,000-ft Wide Corridor
DEIS HVDC 1,000-ft Wide Corridor

Structures
Commercial/Industrial
Agriculture

Oil and Gas Wells
Oil and Gas Wells

Note: Routes shown with representative lines not indicative of corridor or ROW widths

Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
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Region 2 Link 2 Variation 2 Sheet 2

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Region 2 Link 2 Variation 2 Sheet 3

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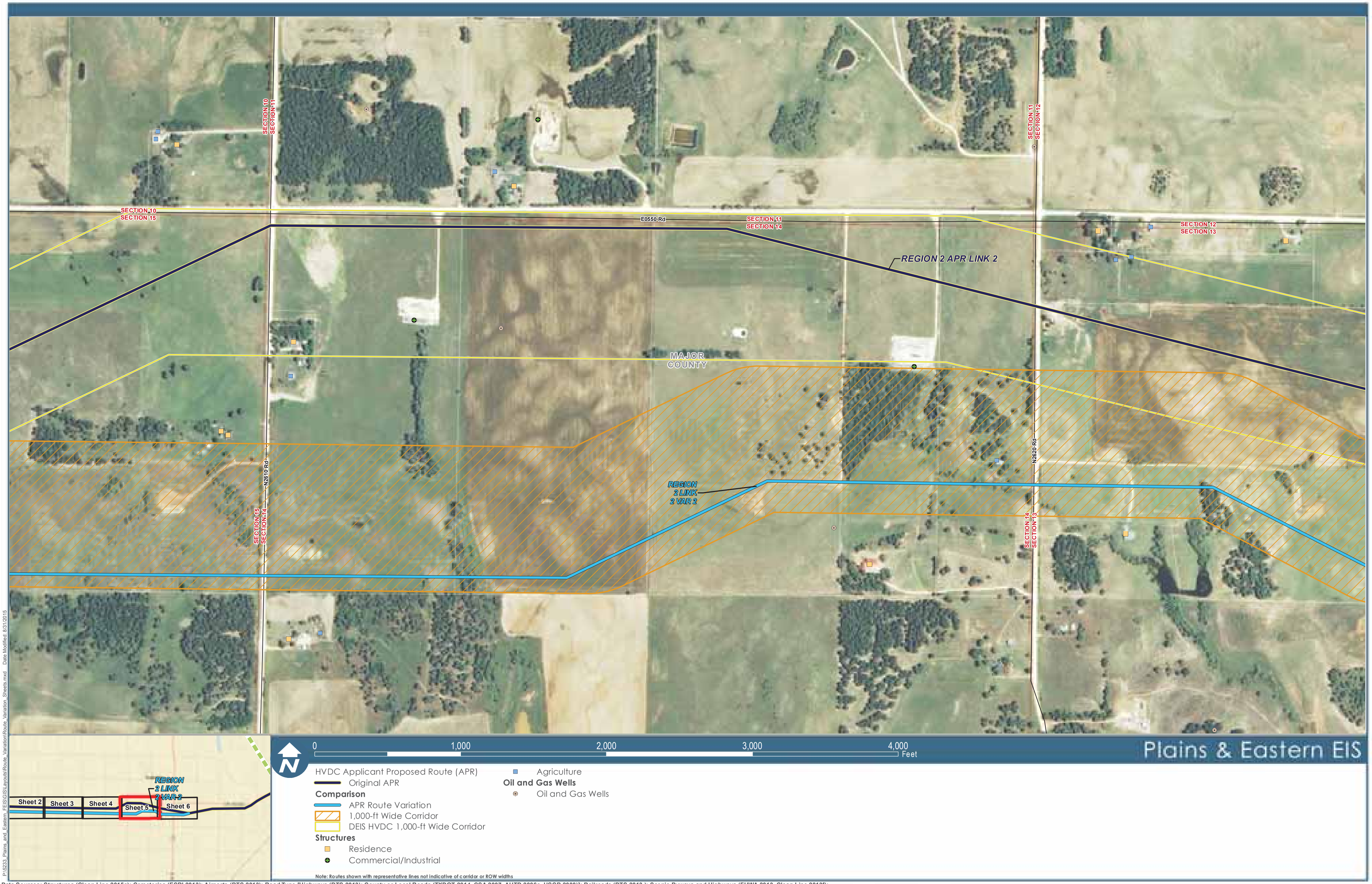
Region 2 Link 2 Variation 2 Sheet 4



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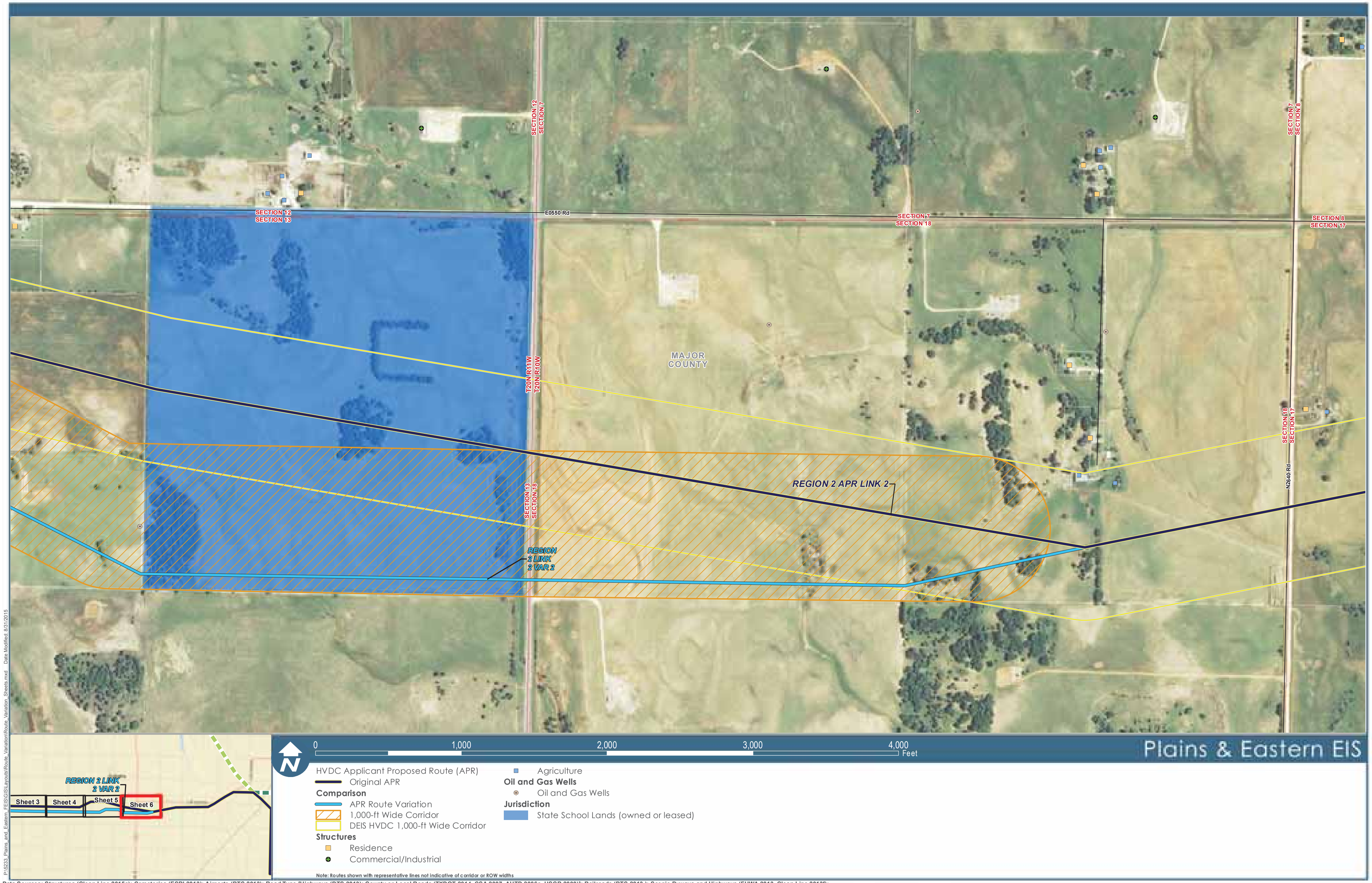
Region 2 Link 2 Variation 2 Sheet 5



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Region 2 Link 2 Variation 2 Sheet 6

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Region 3 Link 1 Variation 2 Sheet 1

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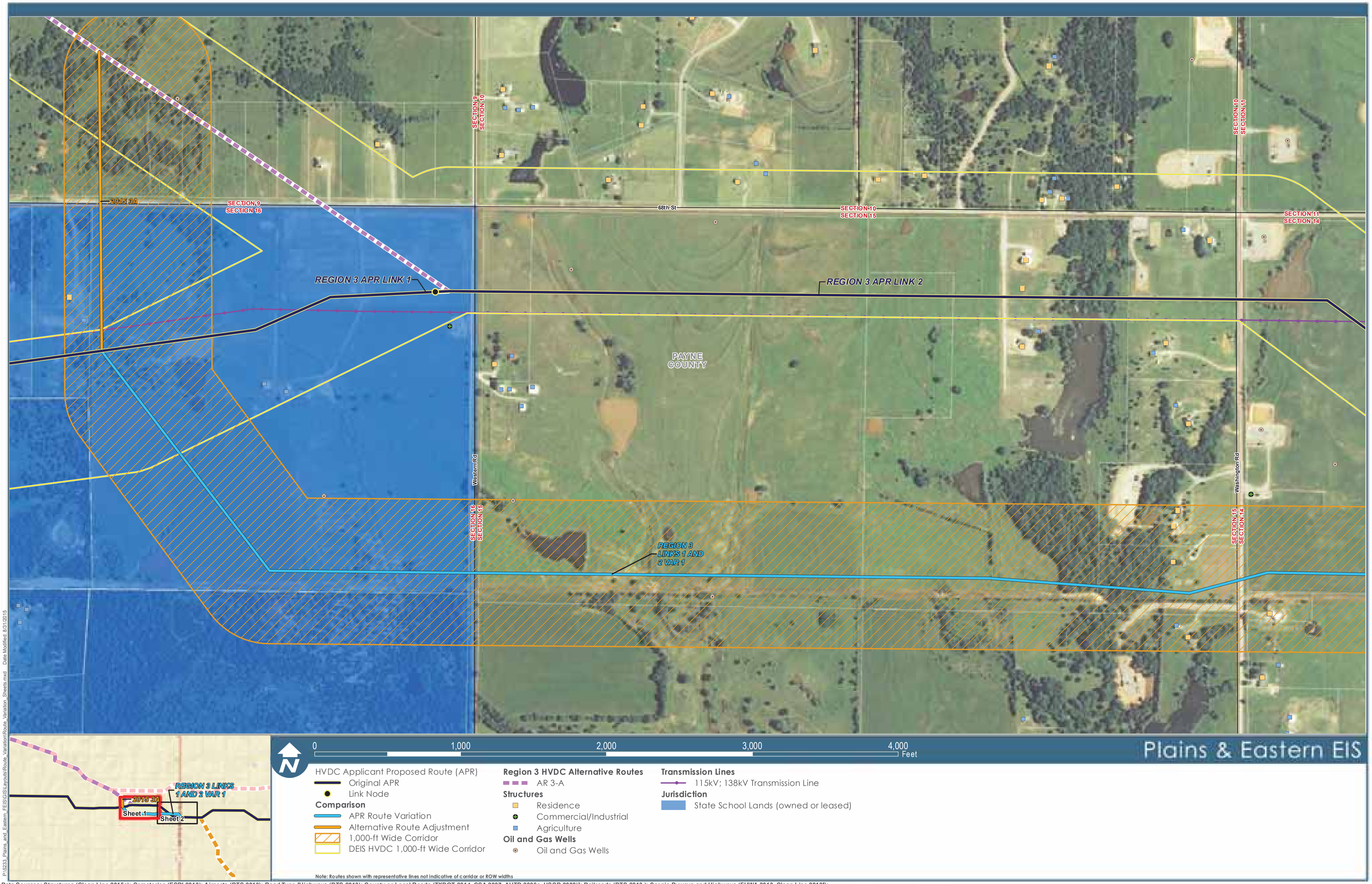
Region 3 Link 1 Variation 2 Sheet 2



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Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
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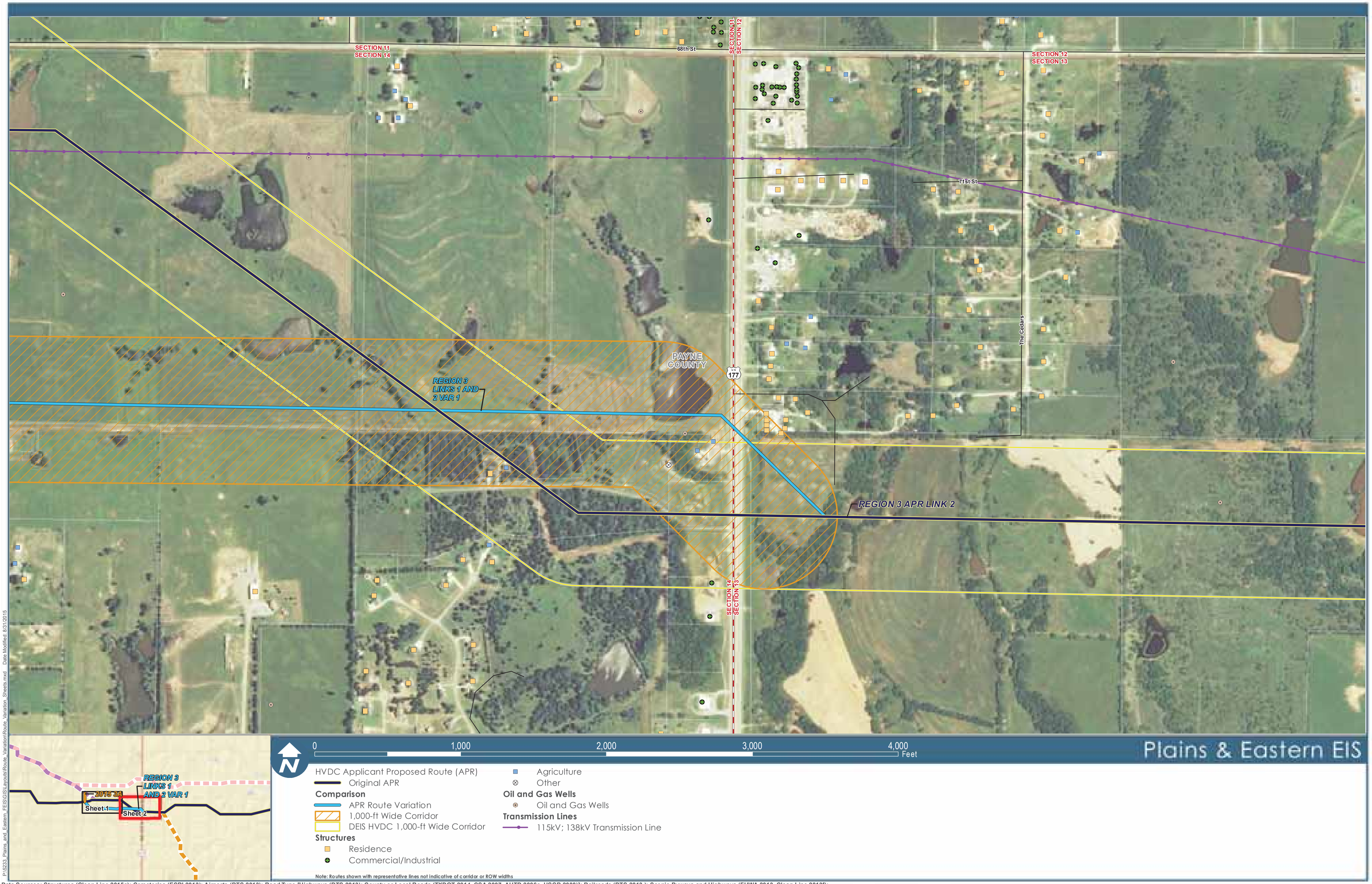
Region 3 Links 1 and 2 Variation 1 Sheet 1



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Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
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Region 3 Links 1 and 2 Variation 1 Sheet 2

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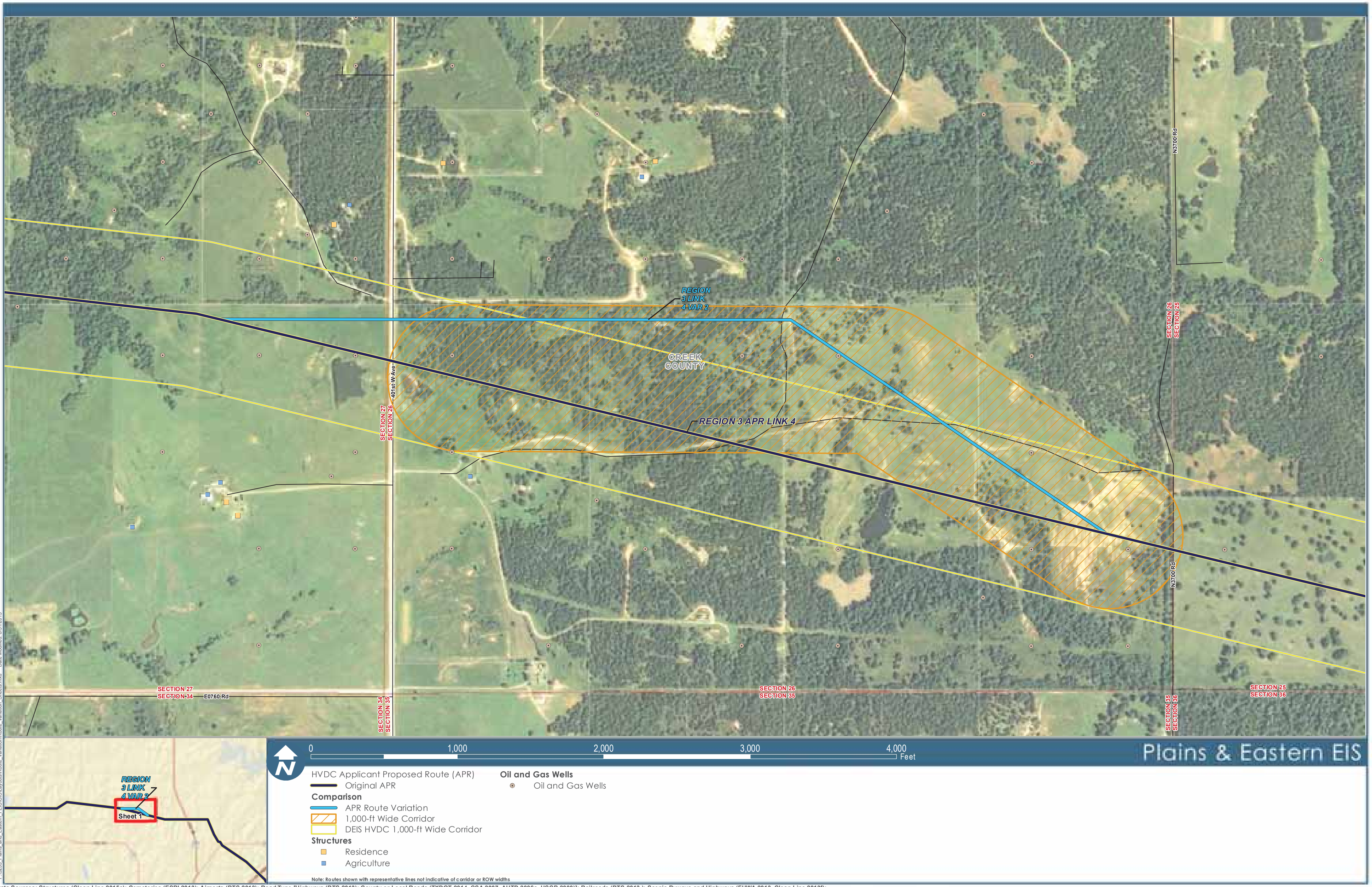
Region 3 Link 4 Variation 1 Sheet 1



Plains & Eastern EIS

HVDC Applicant Proposed Route (APR)
- Original APR

Comparison
- APR Route Variation
- 1,000-ft Wide Corridor
- DEIS HVDC 1,000-ft Wide Corridor

Structures
- Residence
- Agriculture

Oil and Gas Wells
- Oil and Gas Wells

Note: Routes shown with representative lines not indicative of corridor or ROW widths

Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*

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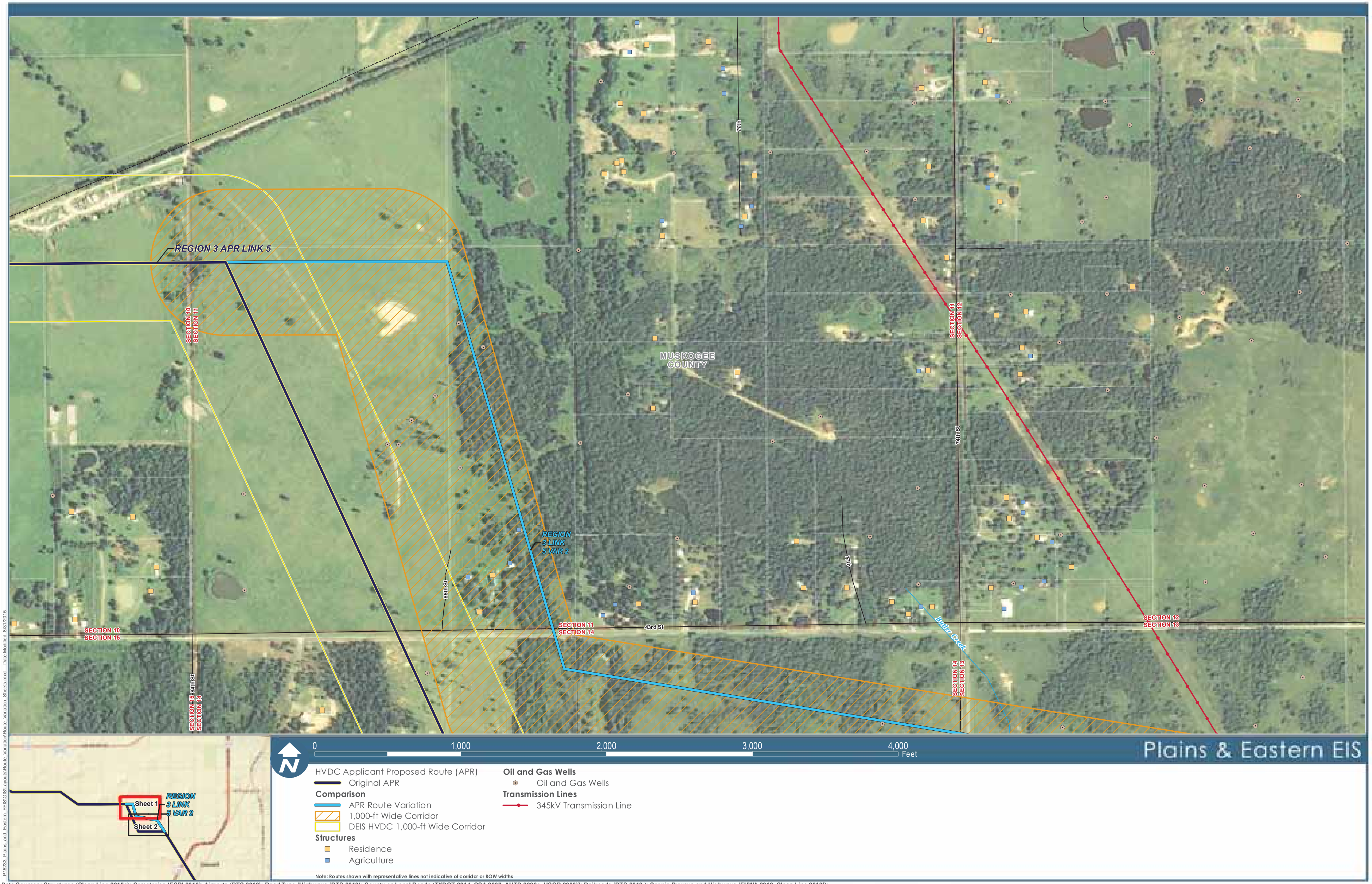
Region 3 Link 4 Variation 2 Sheet 1



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Region 3 Link 5 Variation 2 Sheet 1

Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
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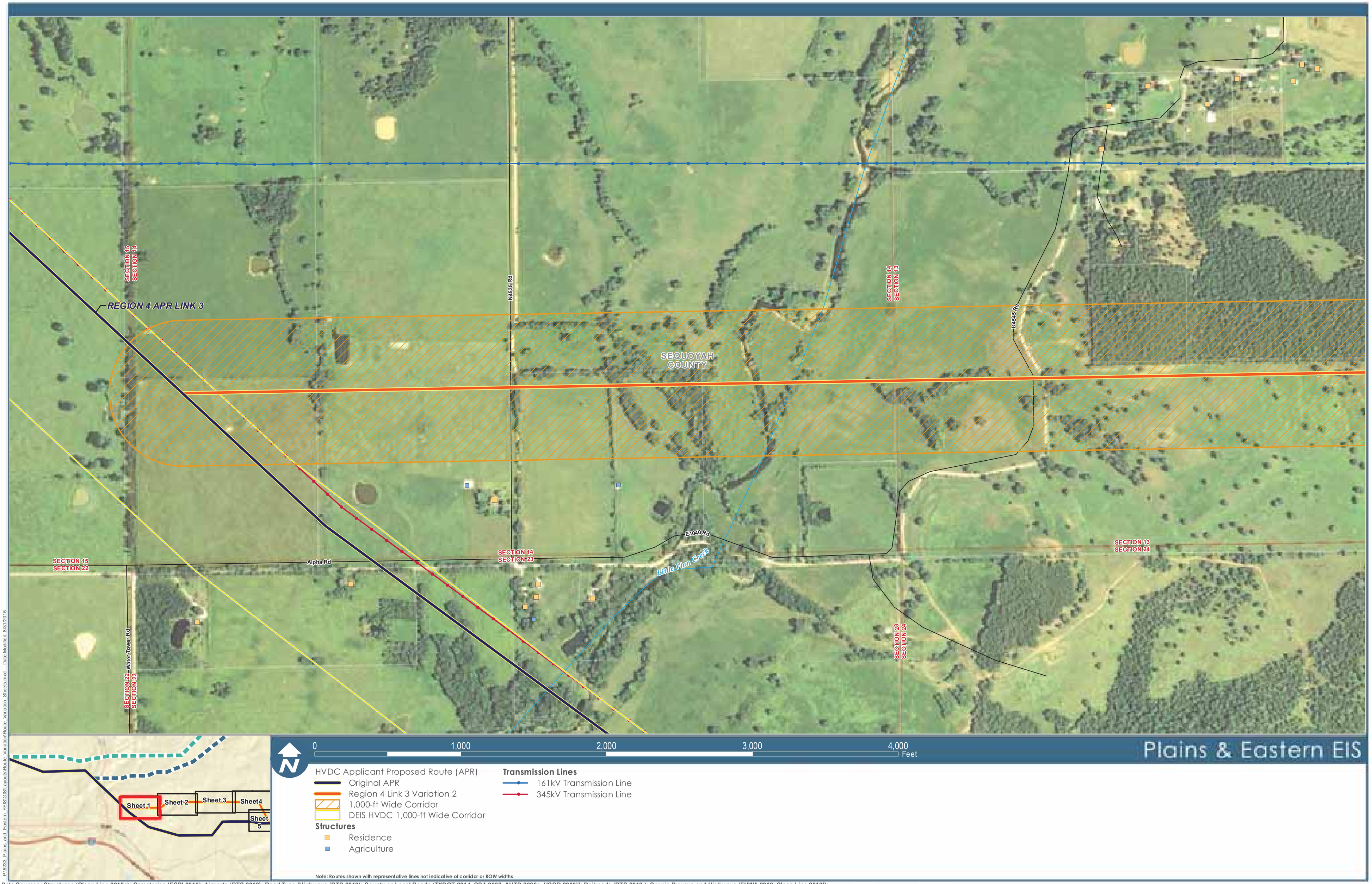
Region 3 Link 5 Variation 2 Sheet 2



Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*

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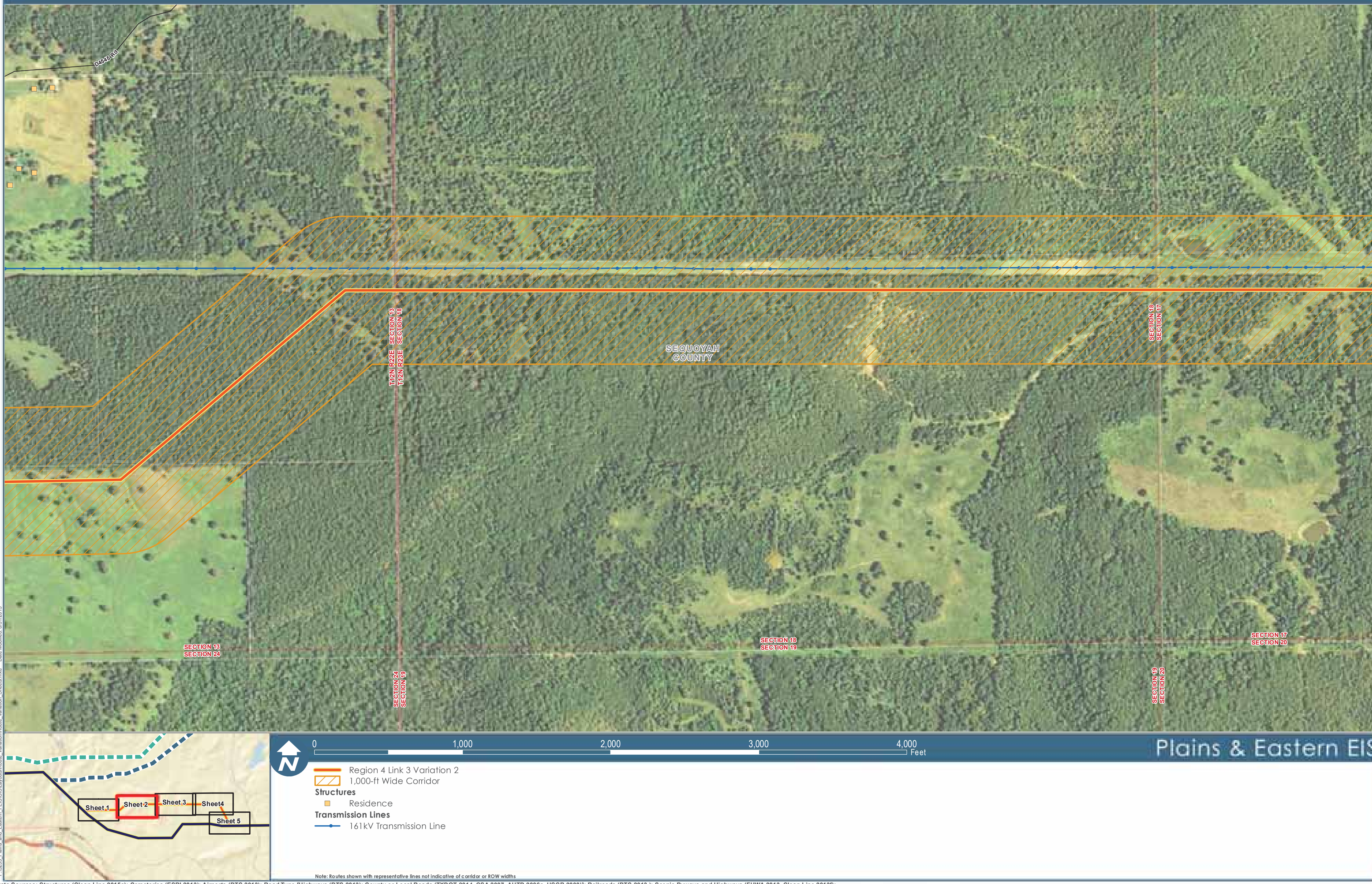
Region 4 Link 3 Variation 2 Sheet 1



Plains & Eastern EIS

Region 4 Link 3 Variation 2
1,000-ft Wide Corridor
Structures
Residence
Transmission Lines
161kV Transmission Line

Note: Routes shown with representative lines not indicative of corridor or ROW widths

Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
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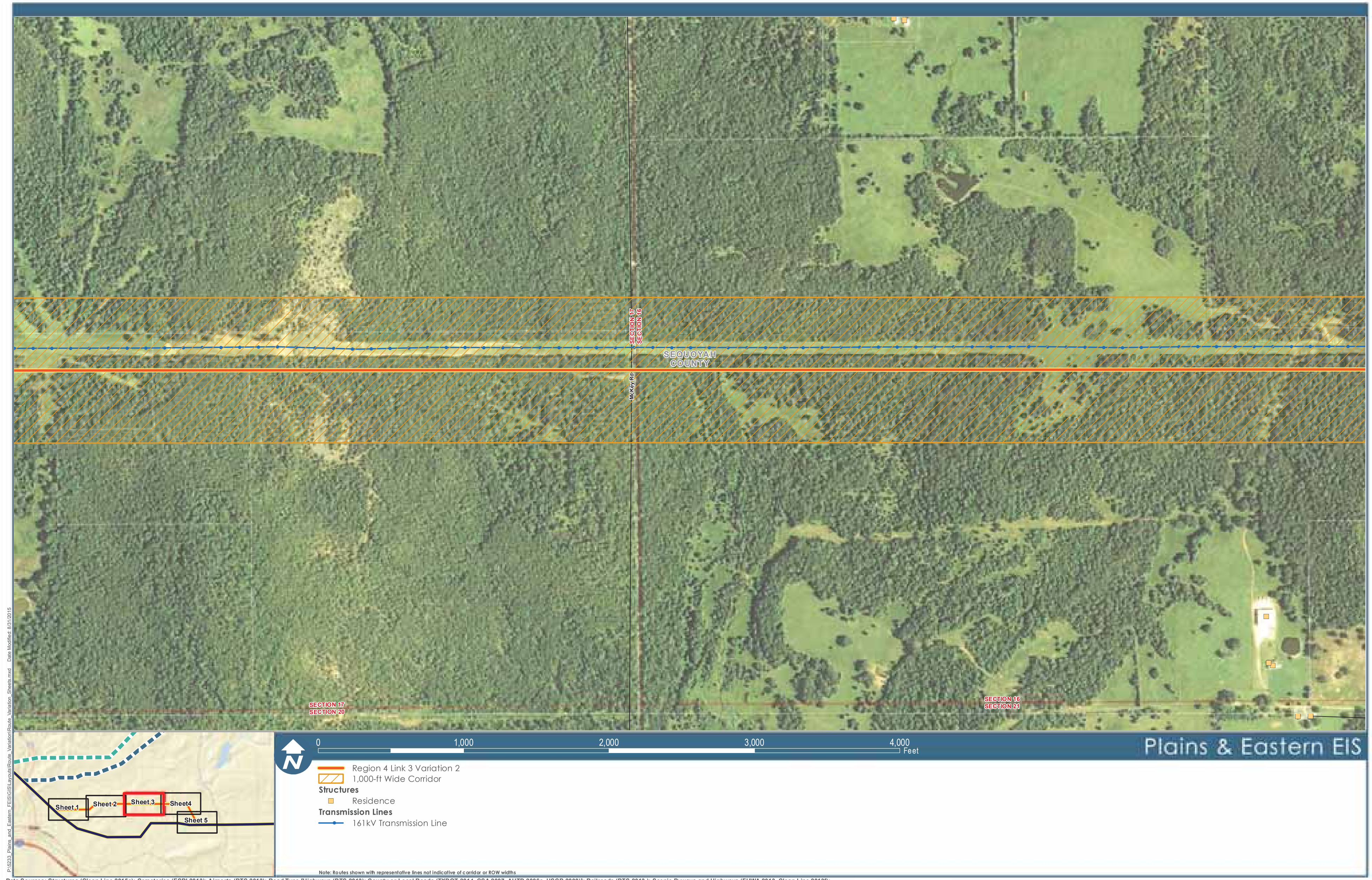
Region 4 Link 3 Variation 2 Sheet 2



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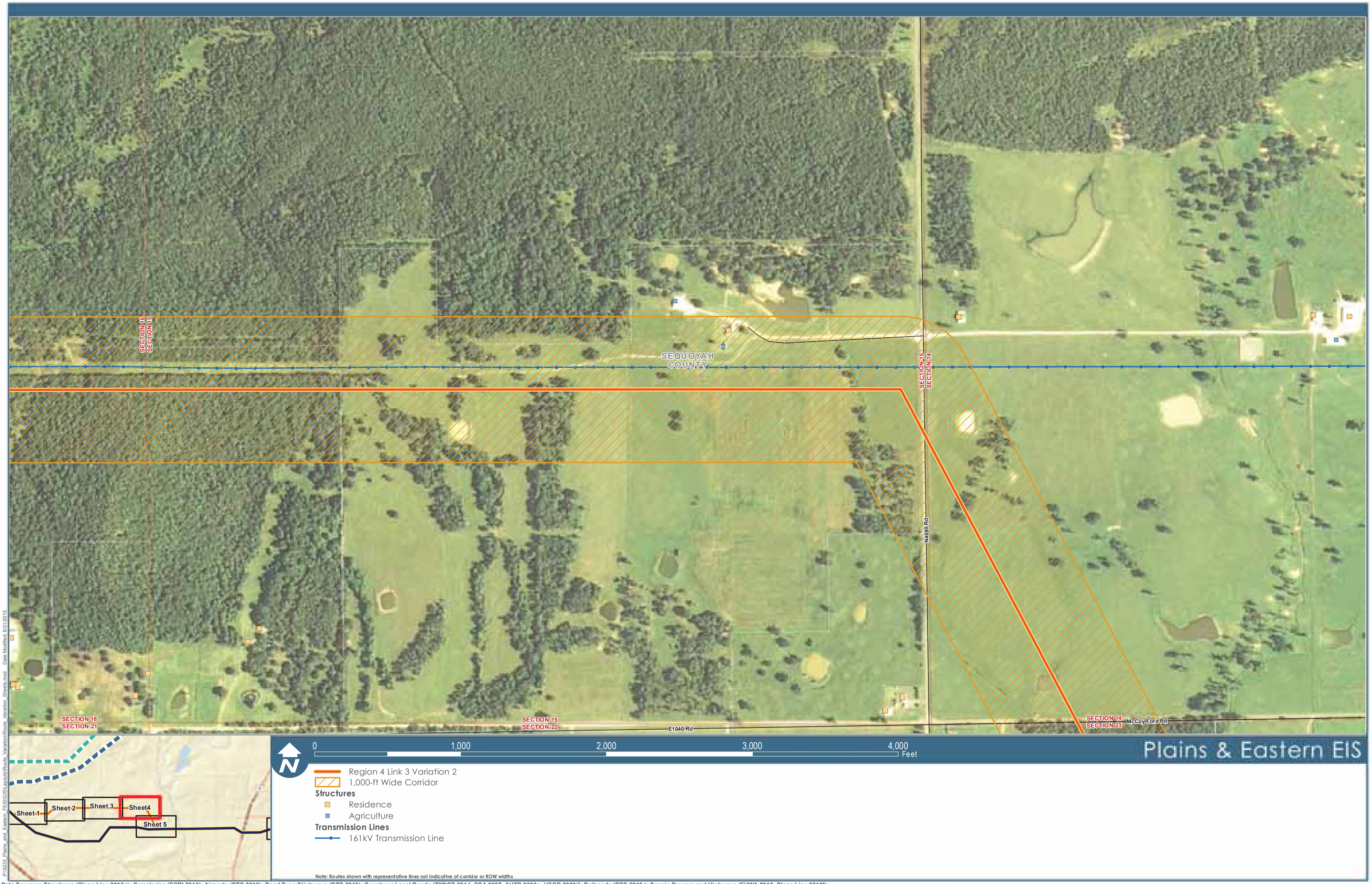
Region 4 Link 3 Variation 2 Sheet 3



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Region 4 Link 3 Variation 2 Sheet 4

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Plains & Eastern EIS

HVDC Applicant Proposed Route (APR)
- Original APR
- Region 4 Link 3 Variation 2
- 1,000-ft Wide Corridor
- DEIS HVDC 1,000-ft Wide Corridor

Structures
- Residence
- Agriculture
- Cemetery

Note: Routes shown with representative lines not indicative of corridor or ROW widths

P:\5233_Plains_and_Eastern_FEIS\GIS\Layouts\Route_Variation\Route_Variation_Sheets.mxd Date Modified: 8/31/2015

Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
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Region 4 Link 3 Variation 2 Sheet 5

Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*

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Region 4 Link 3 Variation 1 Sheet 1

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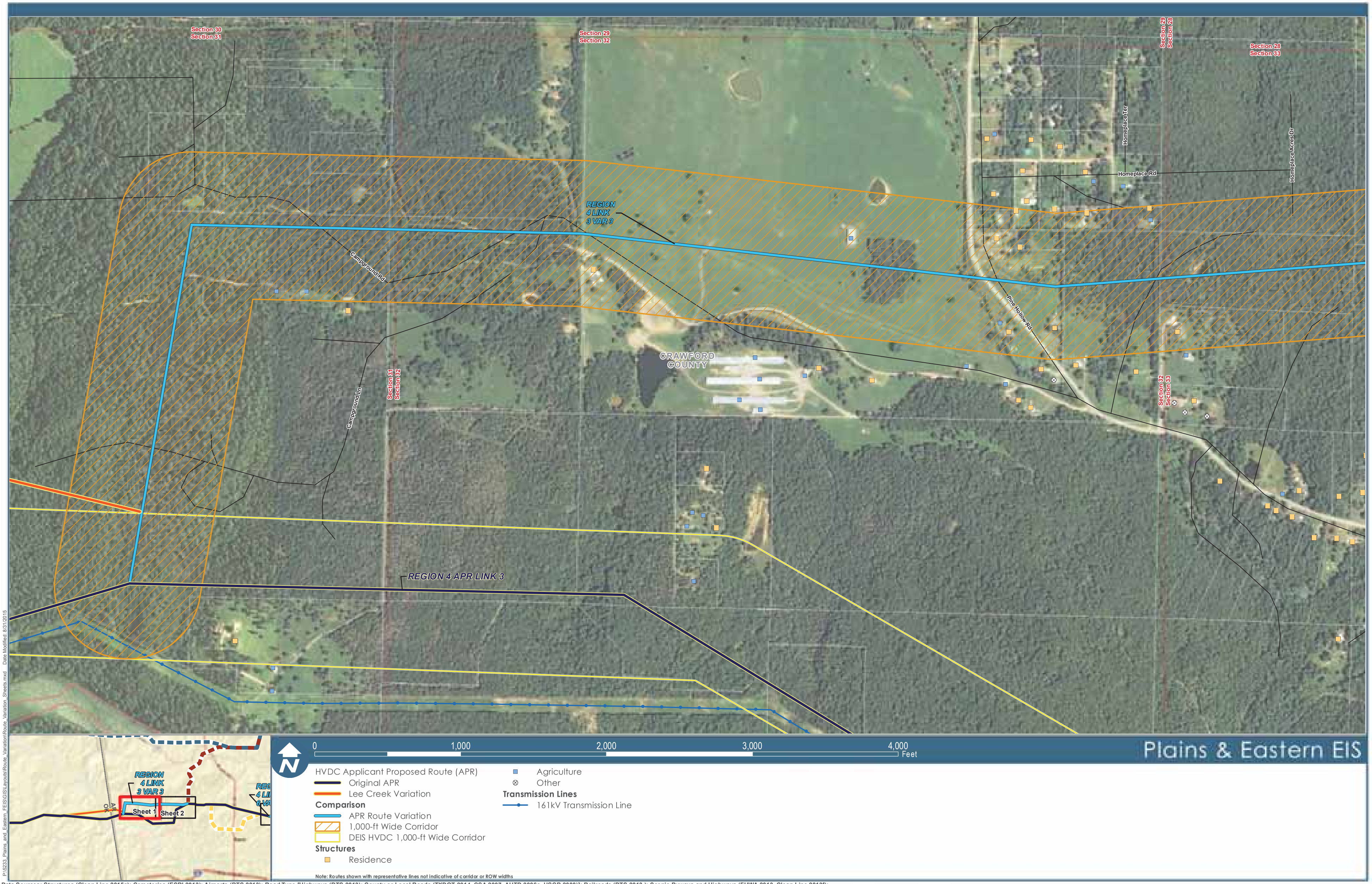
Region 4 Link 3 Variation 1 Sheet 2



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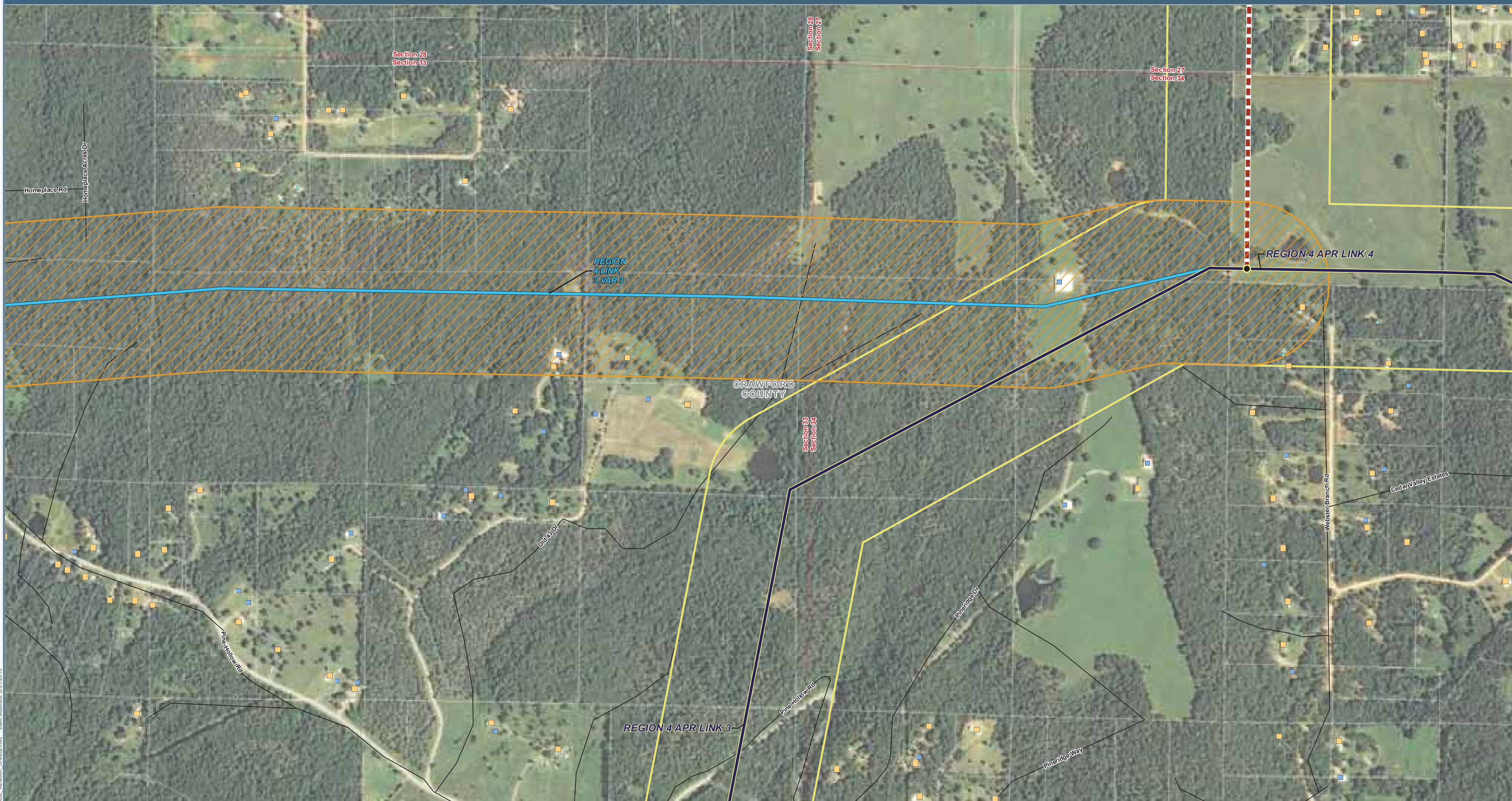
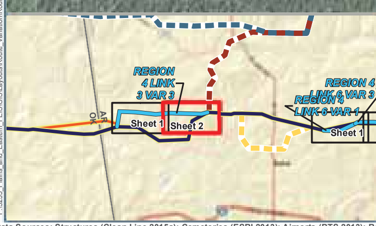
Region 4 Link 3 Variation 3 Sheet 1





0 1,000 2,000 3,000 4,000 Feet

Plains & Eastern EIS

HVDC Applicant Proposed Route (APR)
- Original APR
- Link Node

Comparison
- APR Route Variation
- 1,000-ft Wide Corridor
- DEIS HVDC 1,000-ft Wide Corridor

Region 4 HVDC Alternative Routes
- AR 4-D

Structures
- Residence
- Agriculture
- Abandoned

Note: Routes shown with representative lines not indicative of corridor or ROW widths

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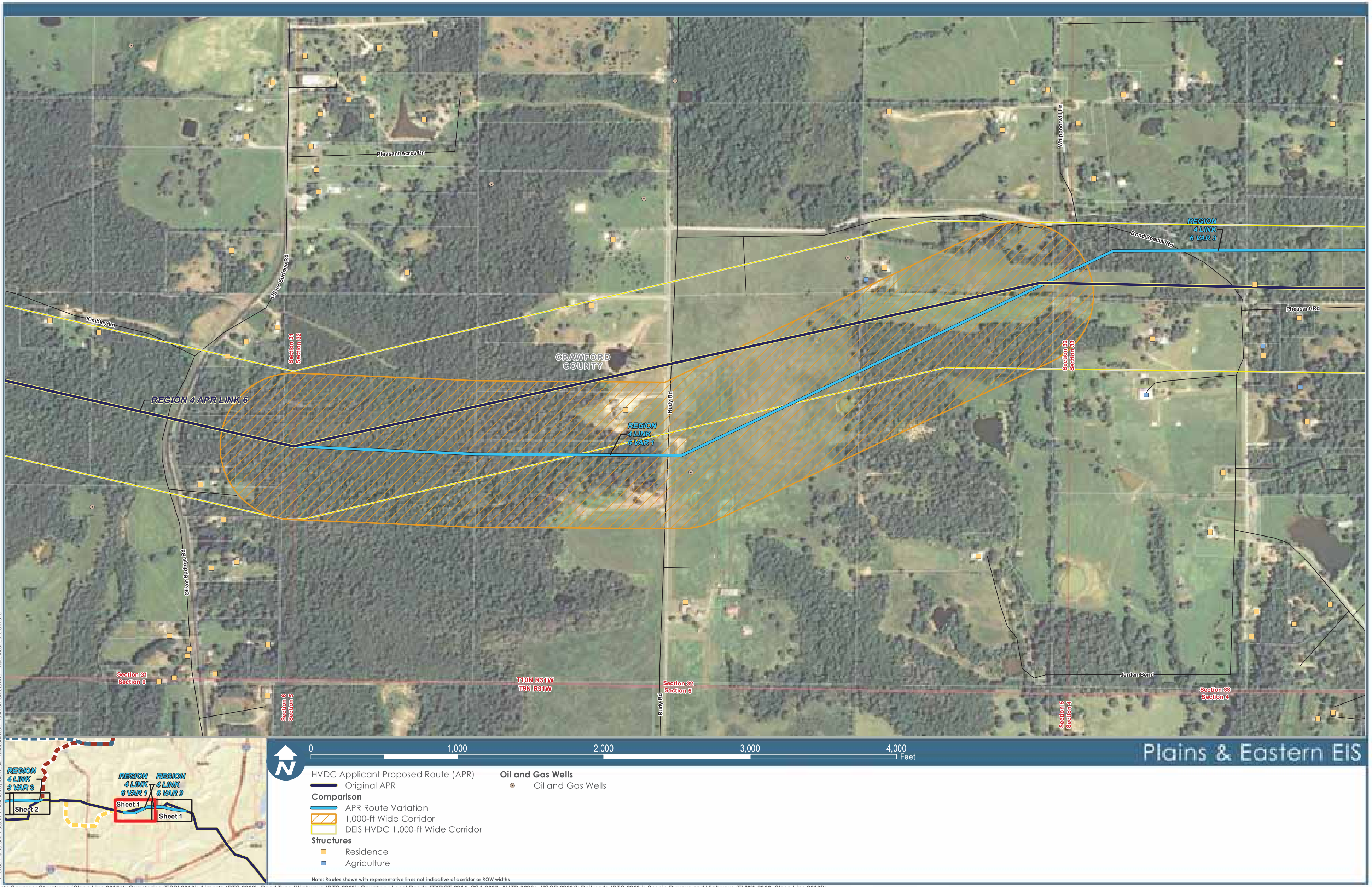
Region 4 Link 3 Variation 3 Sheet 2



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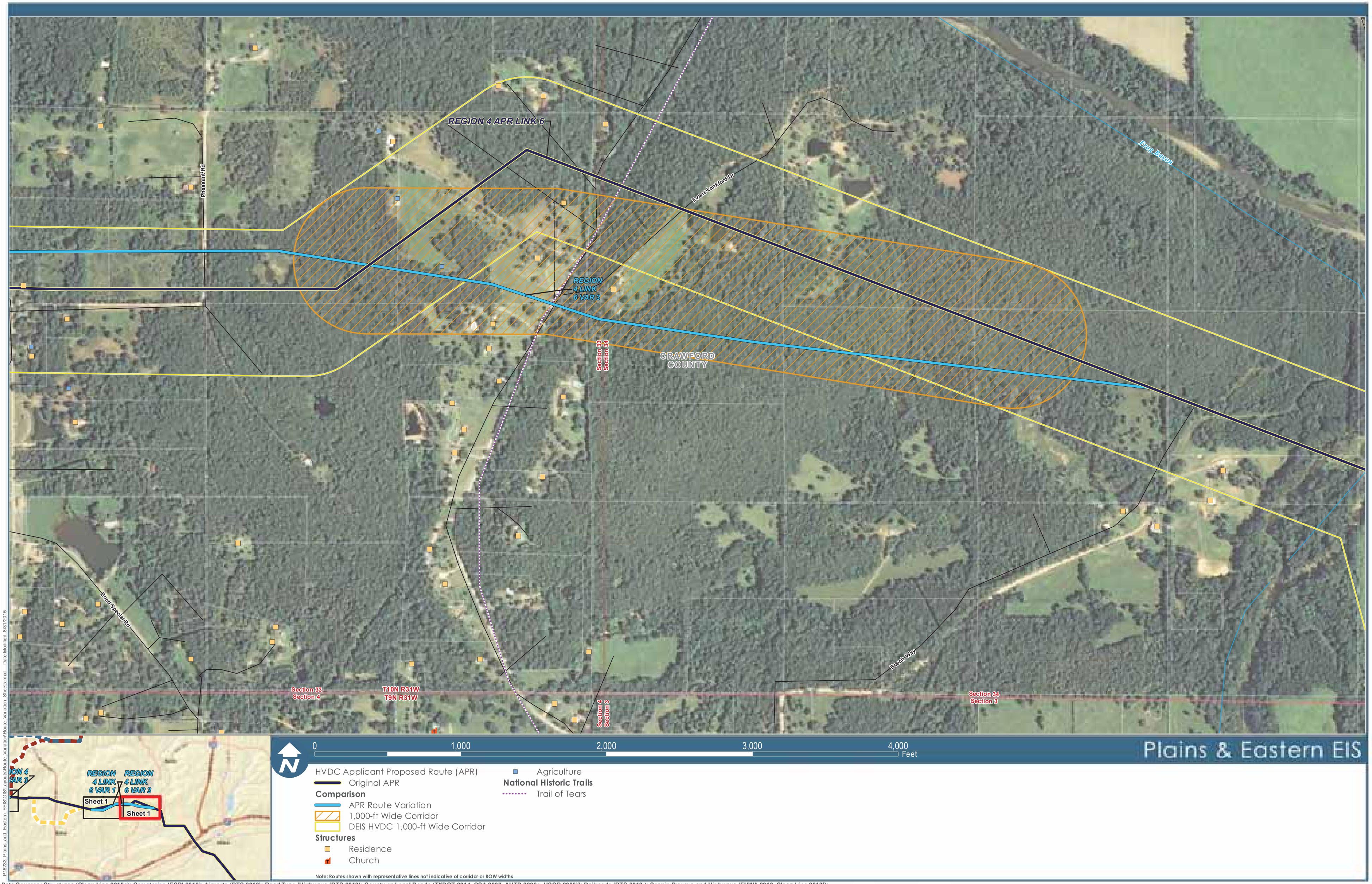
Region 4 Link 6 Variation 1 Sheet 1



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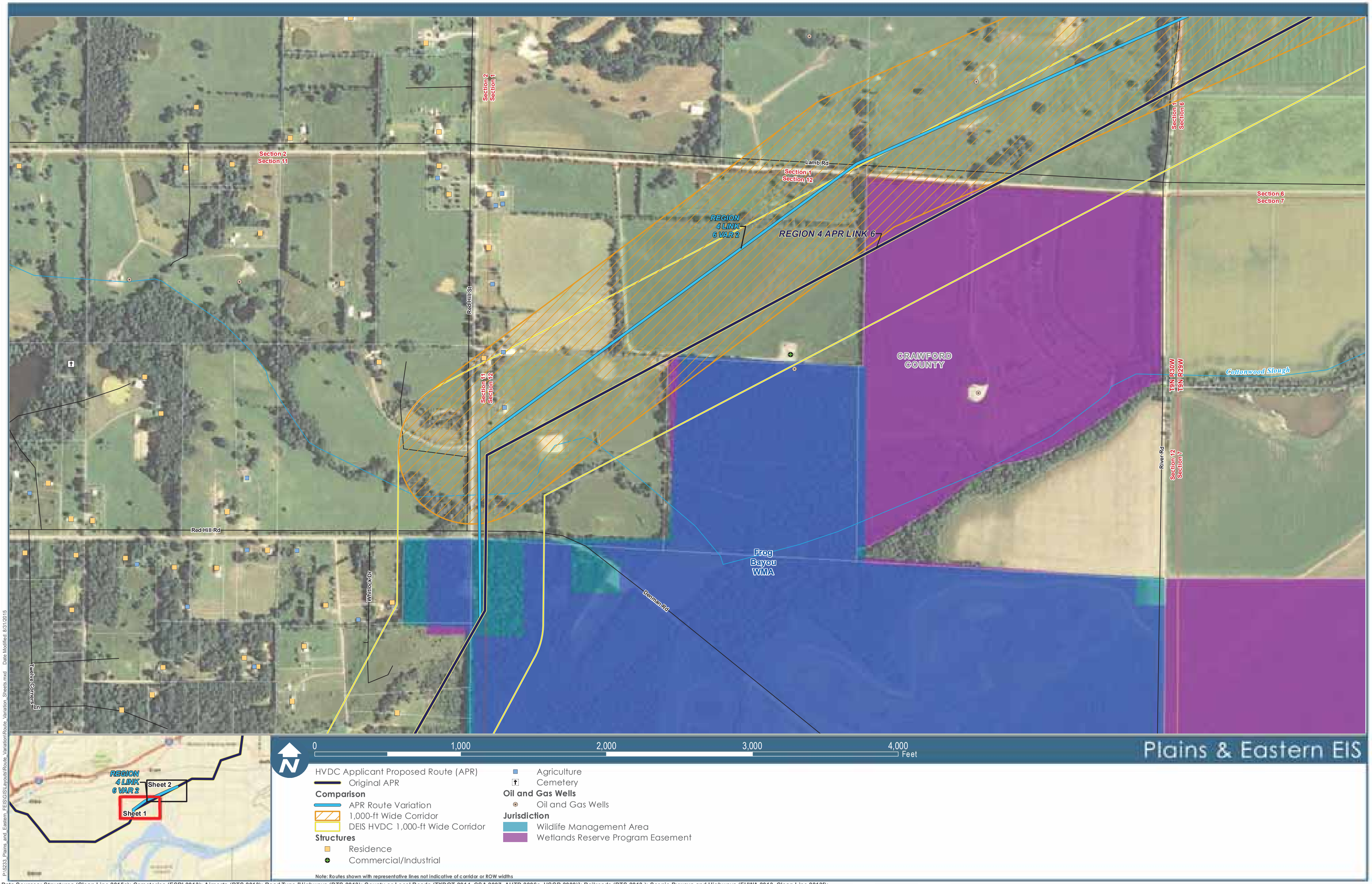
Region 4 Link 6 Variation 3 Sheet 1



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Region 4 Link 6 Variation 2 Sheet 1

Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
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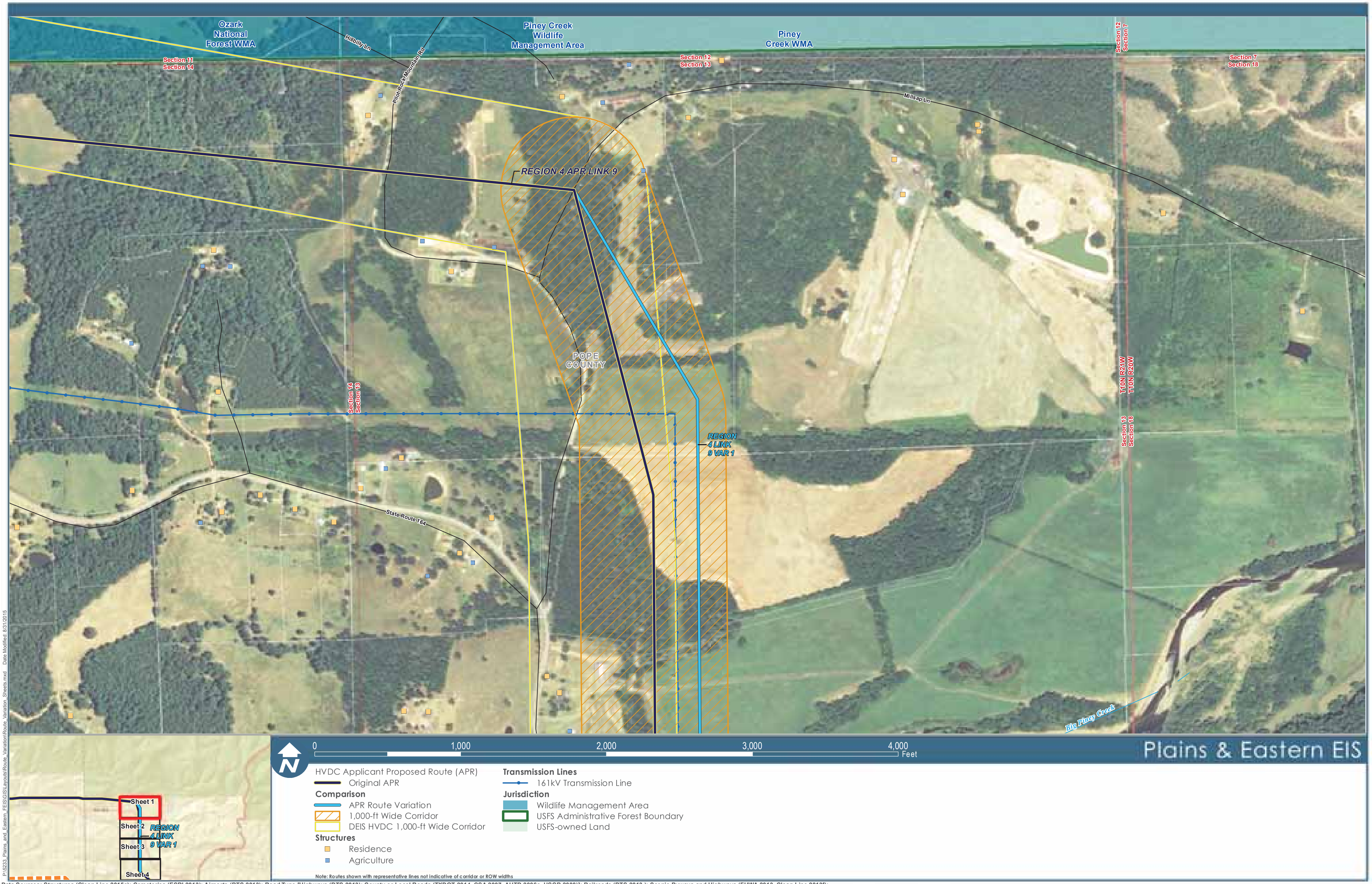
Region 4 Link 6 Variation 2 Sheet 2



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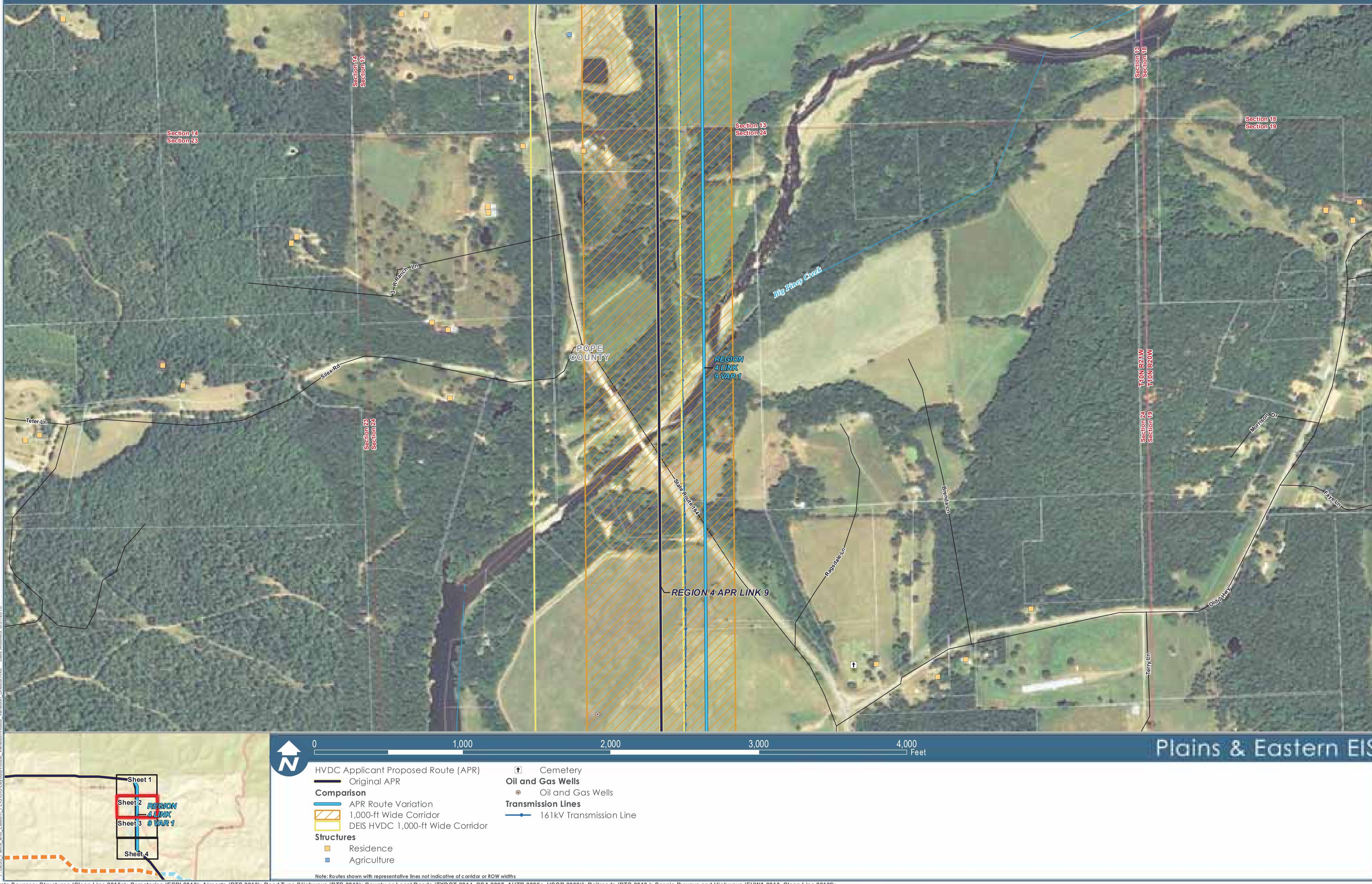
Region 4 Link 9 Variation 1 Sheet 1



0 1,000 2,000 3,000 4,000 Feet

Plains & Eastern EIS

HVDC Applicant Proposed Route (APR)
Original APR

Comparison
APR Route Variation
1,000-ft Wide Corridor
DEIS HVDC 1,000-ft Wide Corridor

Structures
Residence
Agriculture

Cemetery

Oil and Gas Wells
Oil and Gas Wells

Transmission Lines
161kV Transmission Line

Note: Routes shown with representative lines not indicative of corridor or ROW widths

Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
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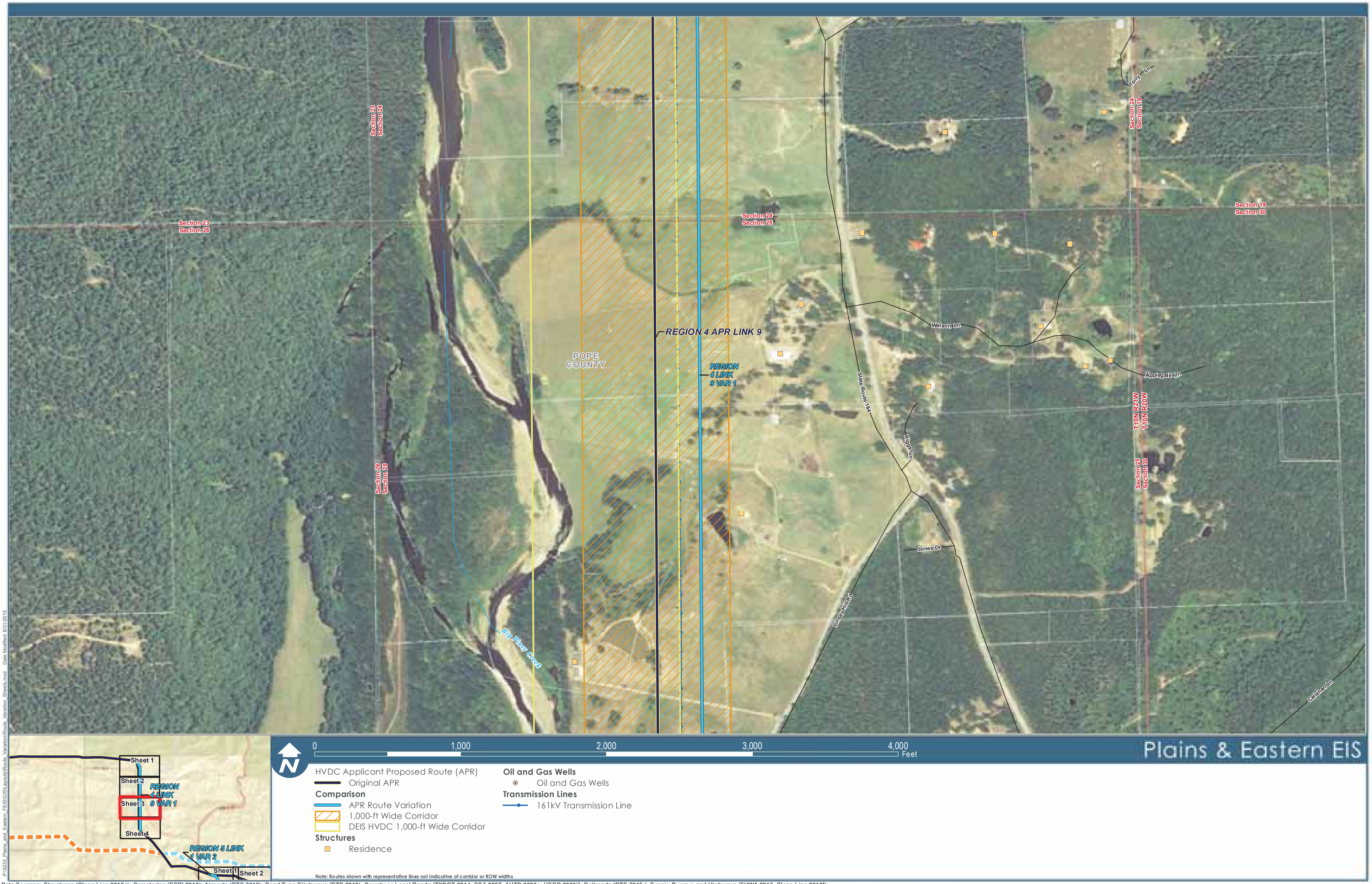
Region 4 Link 9 Variation 1 Sheet 2



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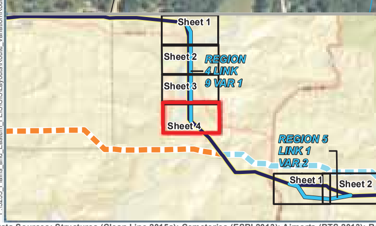
Region 4 Link 9 Variation 1 Sheet 3



0 1,000 2,000 3,000 4,000 Feet

Plains & Eastern EIS

HVDC Applicant Proposed Route (APR)
- Original APR

Comparison
- APR Route Variation
- 1,000-ft Wide Corridor
- DEIS HVDC 1,000-ft Wide Corridor

Structures
- Residence
- Agriculture

Oil and Gas Wells
- Oil and Gas Wells

Transmission Lines
- 161kV Transmission Line

Note: Routes shown with representative lines not indicative of corridor or ROW widths

Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
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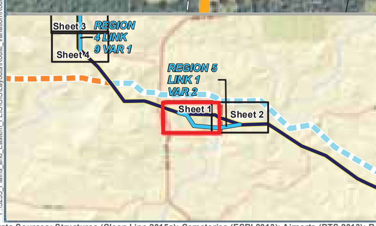
Region 4 Link 9 Variation 1 Sheet 4



Plains & Eastern EIS

0 1,000 2,000 3,000 4,000 Feet

HVDC Applicant Proposed Route (APR)
- Original APR

Comparison
- APR Route Variation
- 1,000-ft Wide Corridor
- DEIS HVDC 1,000-ft Wide Corridor

Structures
- Residence
- Agriculture

- Cemetery

Oil and Gas Wells
- Oil and Gas Wells

Scenic Byways and Highways
- Federal or State Scenic Byway

Note: Routes shown with representative lines not indicative of corridor or ROW widths

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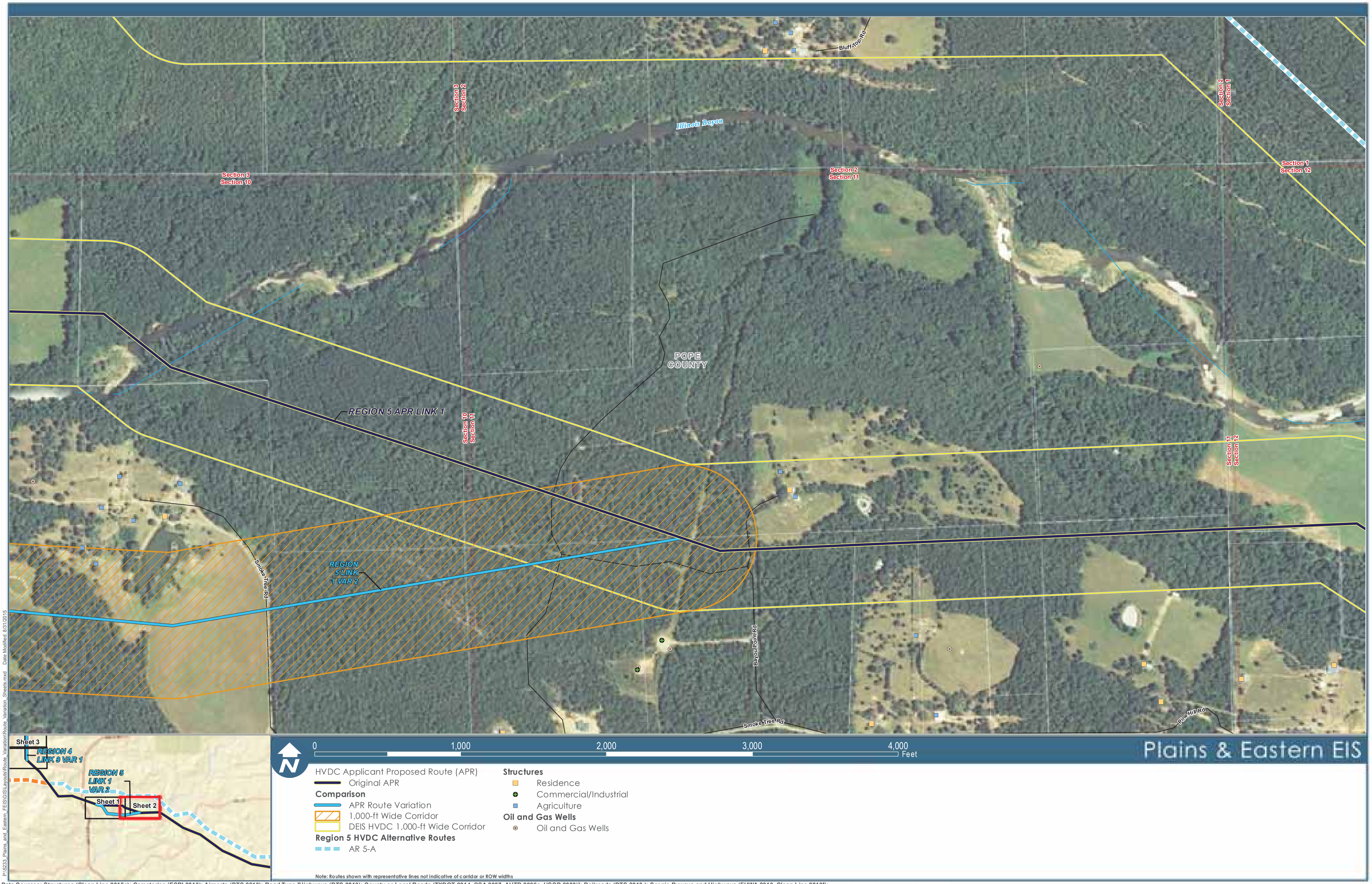
Region 5 Link 1 Variation 2 Sheet 1



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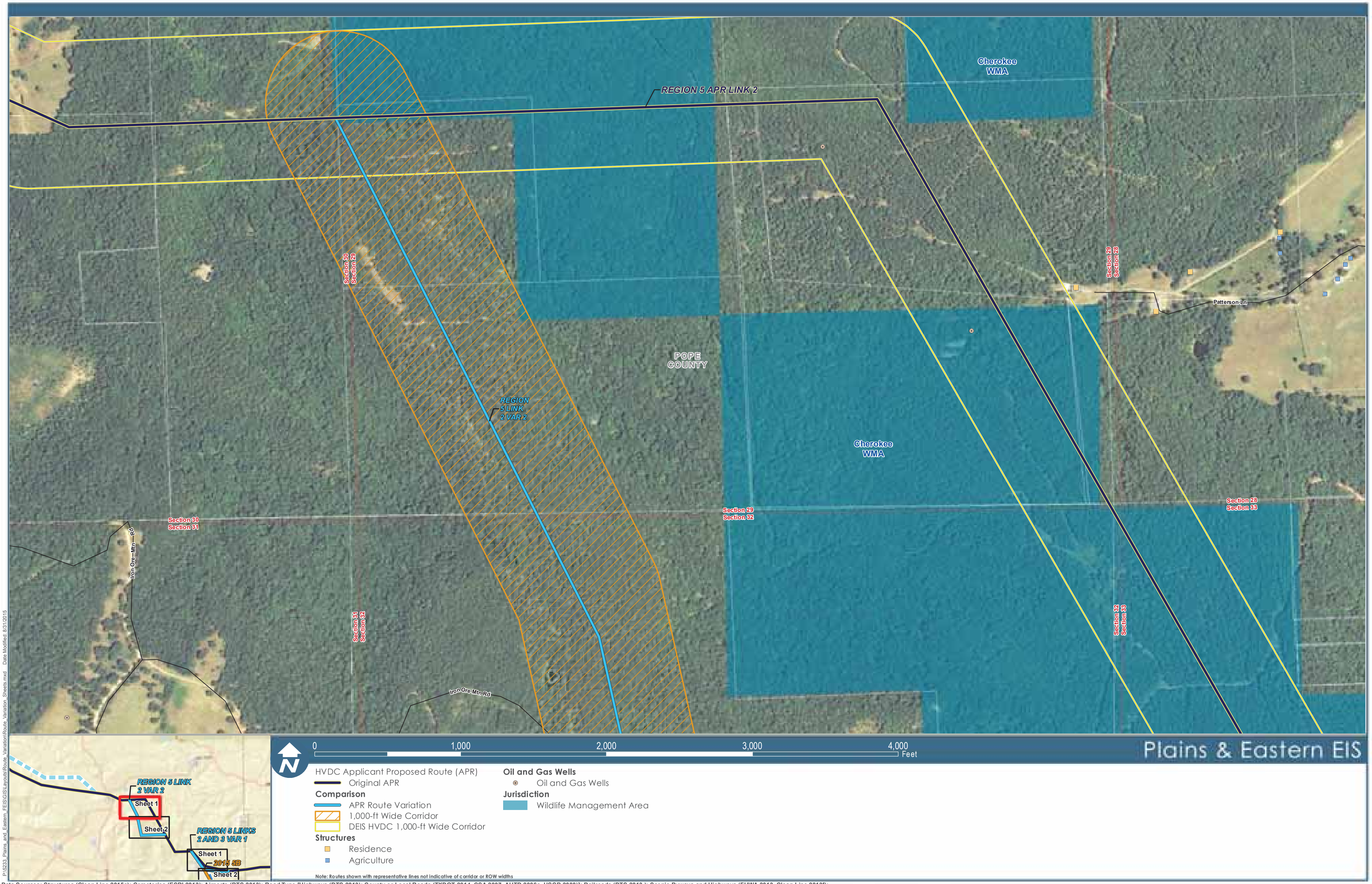
Region 5 Link 1 Variation 2 Sheet 2



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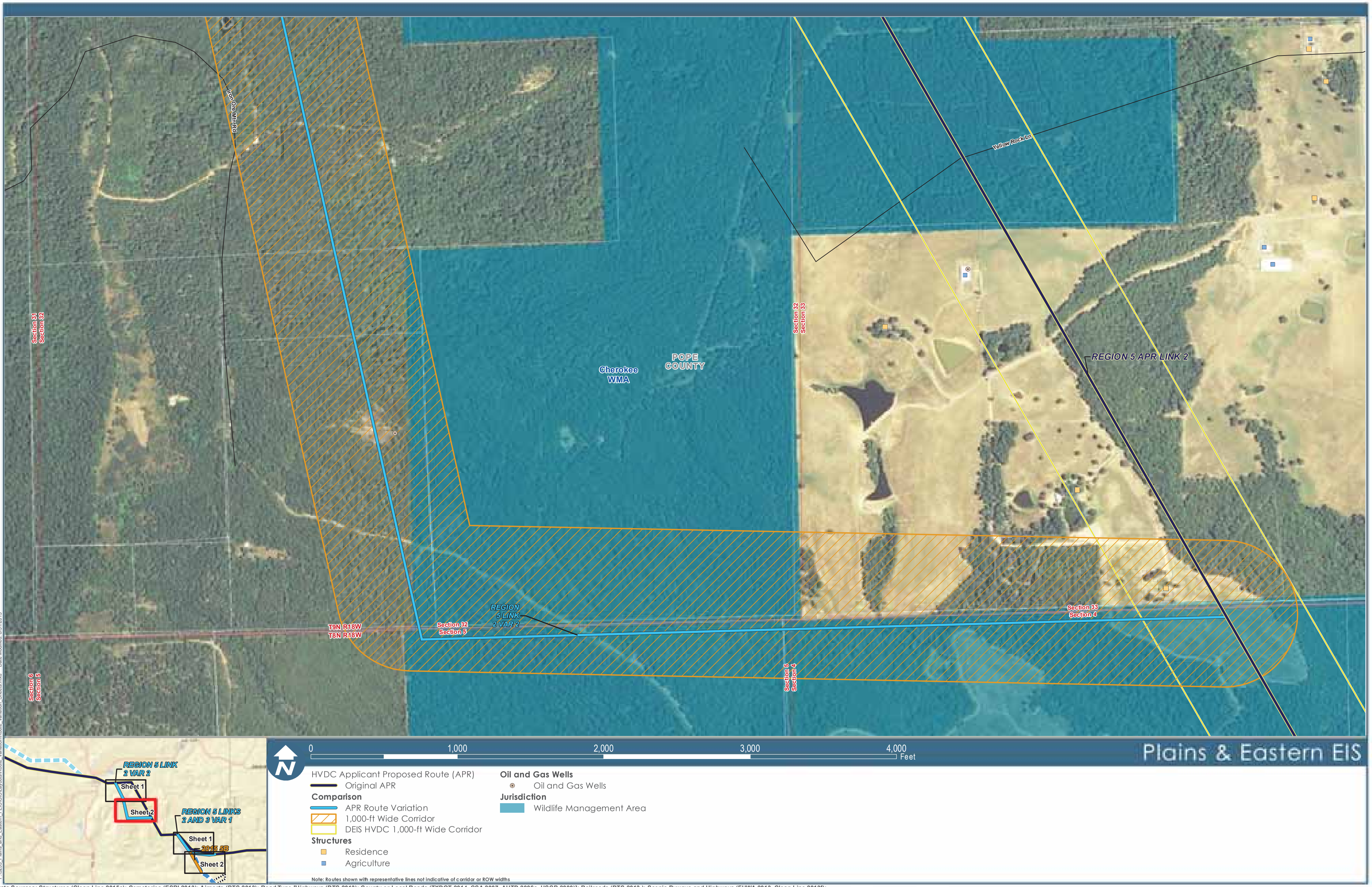
Region 5 Link 2 Variation 2 Sheet 1



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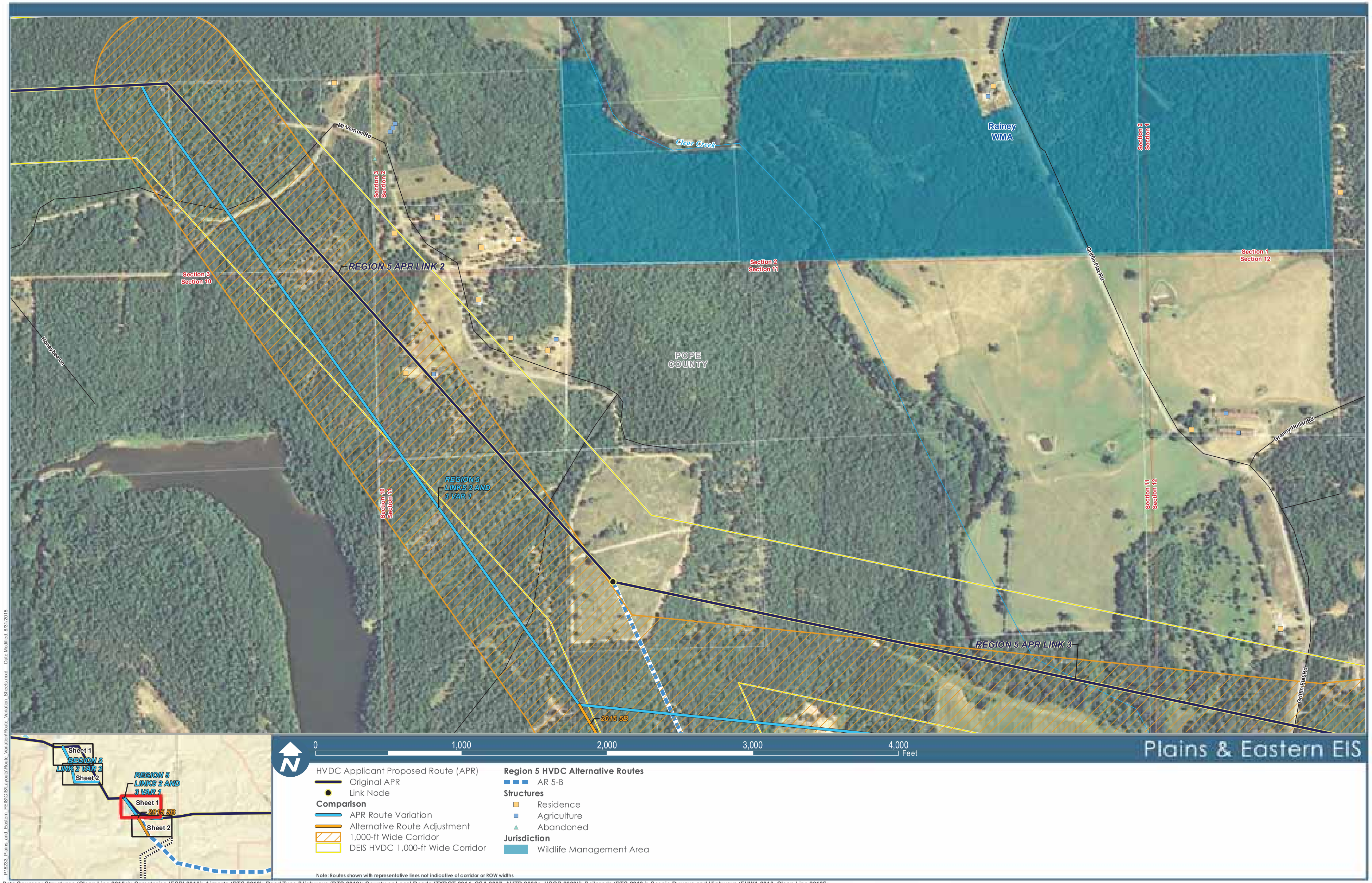
Region 5 Link 2 Variation 2 Sheet 2



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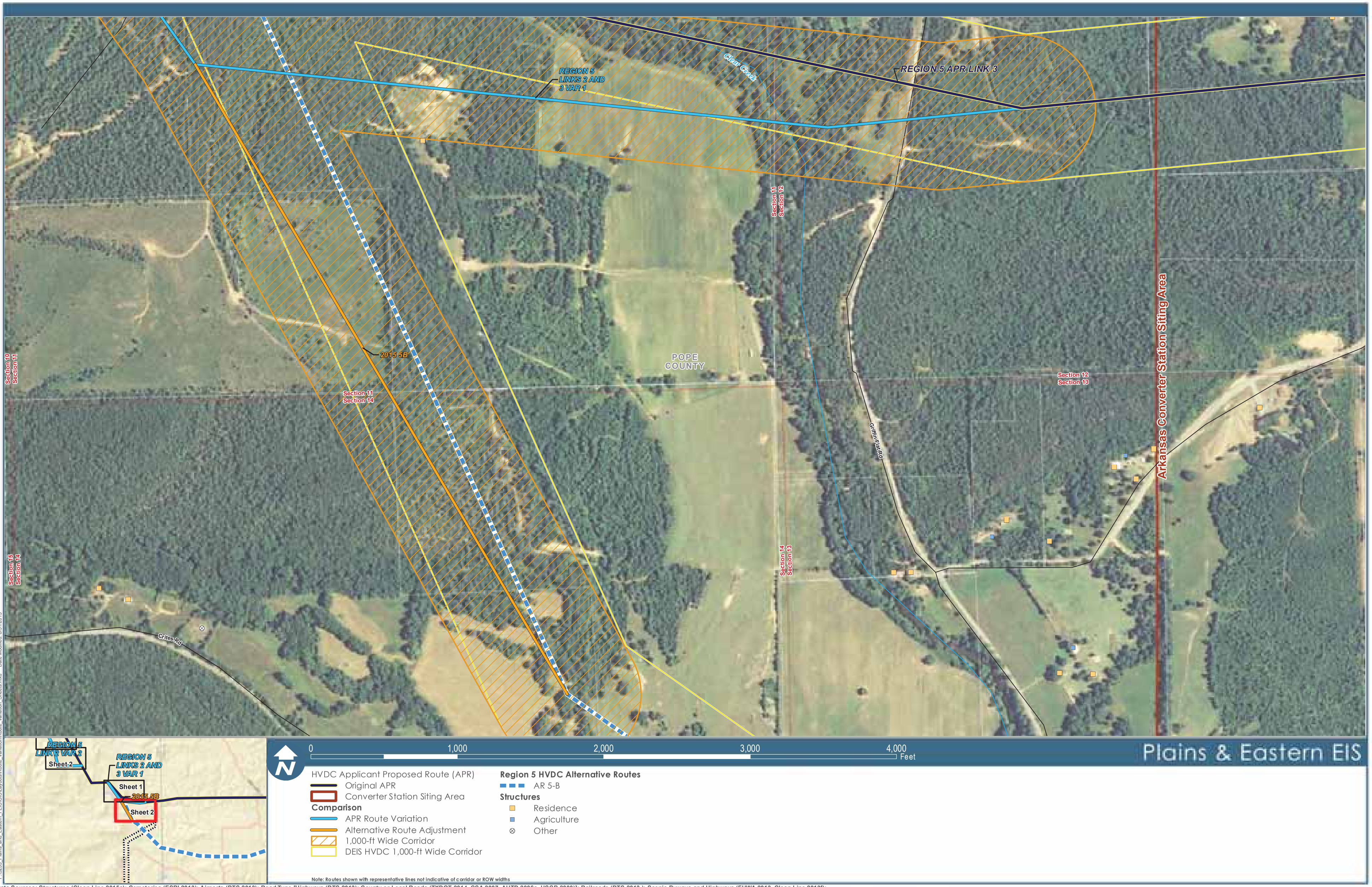
Region 5 Links 2 and 3 Variation 1 Sheet 1



Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
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Region 5 Links 2 and 3 Variation 1 Sheet 2

HVDC Applicant Proposed Route (APR)
Original APR
Comparison
APR Route Variation
1,000-ft Wide Corridor
DEIS HVDC 1,000-ft Wide Corridor
Structures
Residence
Commercial/Industrial
Agriculture
Oil and Gas Wells
Oil and Gas Wells

Note: Routes shown with representative lines not indicative of corridor or ROW widths

Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
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Region 5 Links 3 and 4 Variation 2 Sheet 1

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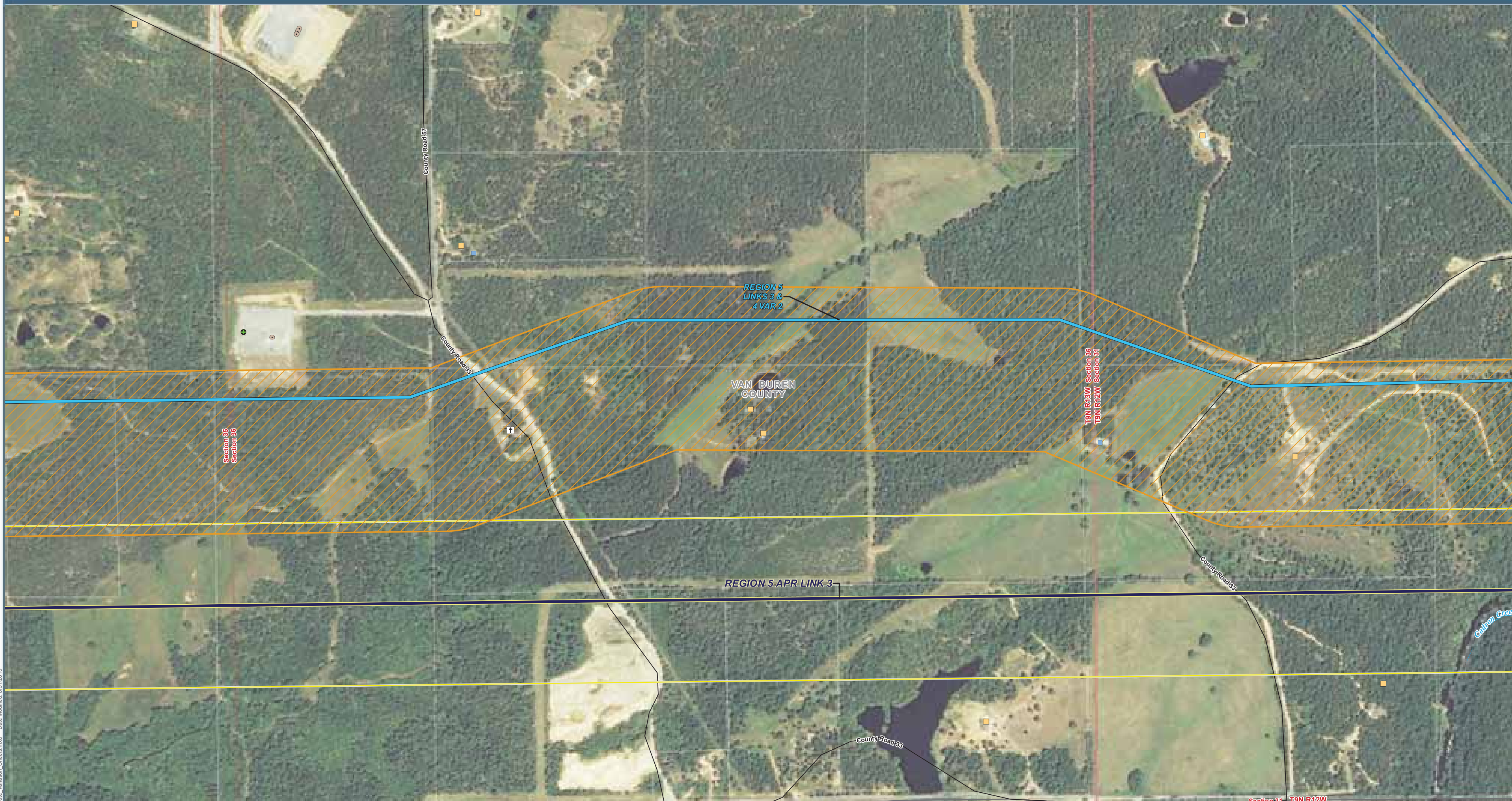

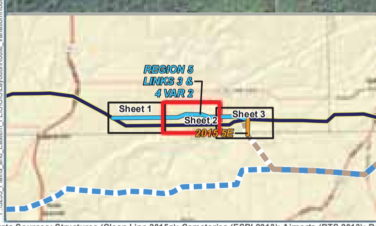

0 1,000 2,000 3,000 4,000 Feet

Plains & Eastern EIS

HVDC Applicant Proposed Route (APR)
- Original APR

Comparison
- APR Route Variation
- 1,000-ft Wide Corridor
- DEIS HVDC 1,000-ft Wide Corridor

Structures
- Residence
- Commercial/Industrial
- Agriculture
- Cemetery

Oil and Gas Wells
- Oil and Gas Wells

Transmission Lines
- 161kV Transmission Line

Note: Routes shown with representative lines not indicative of corridor or ROW widths

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Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*

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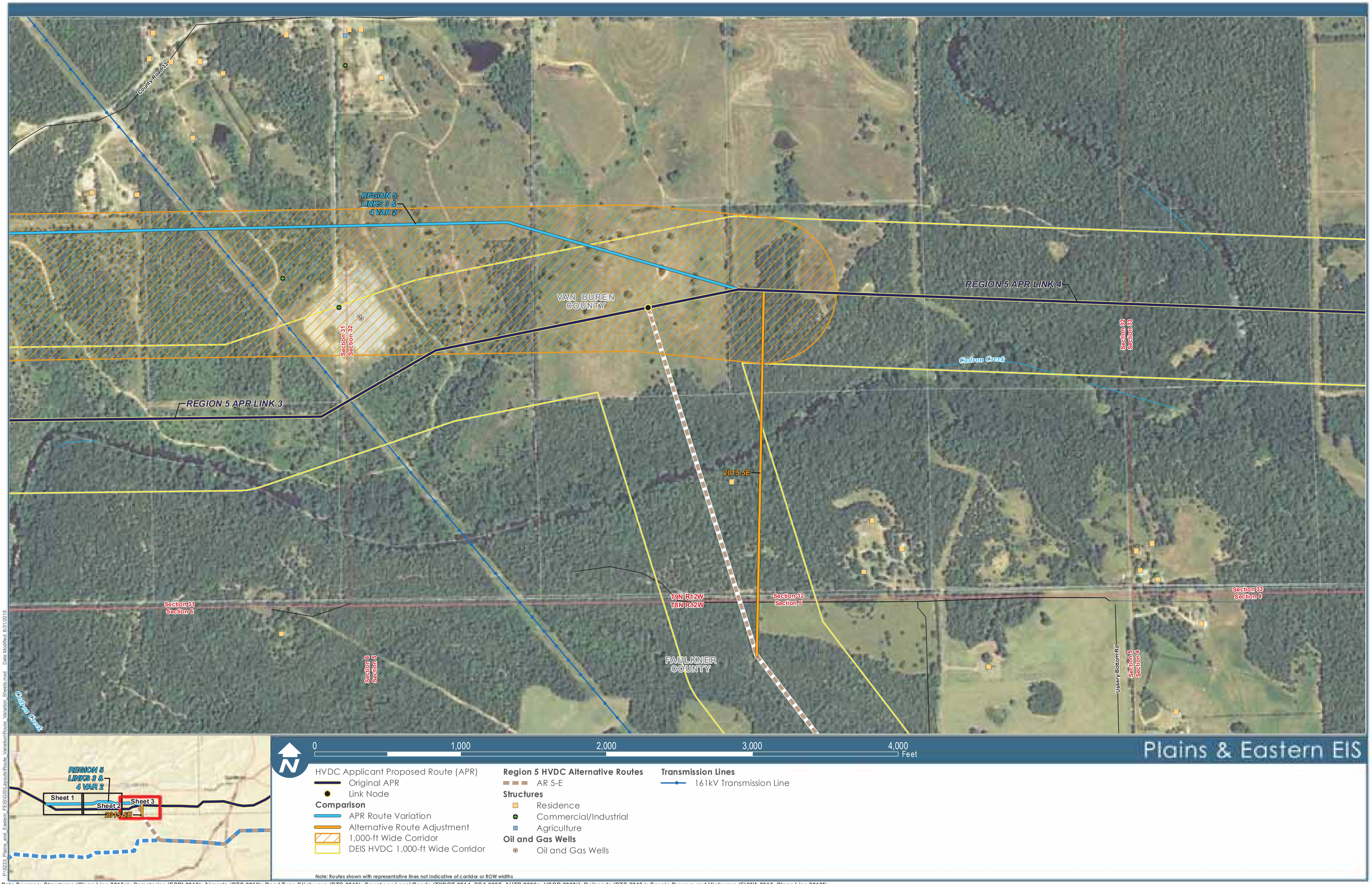
Region 5 Links 3 and 4 Variation 2 Sheet 2



HVDC Applicant Proposed Route (APR)
- Original APR
- Link Node

Comparison
- APR Route Variation
- Alternative Route Adjustment
- 1,000-ft Wide Corridor
- DEIS HVDC 1,000-ft Wide Corridor

Region 5 HVDC Alternative Routes
- AR 5-E

Structures
- Residence
- Commercial/Industrial
- Agriculture

Oil and Gas Wells
- Oil and Gas Wells

Transmission Lines
- 161kV Transmission Line

Note: Routes shown with representative lines not indicative of corridor or ROW widths

Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
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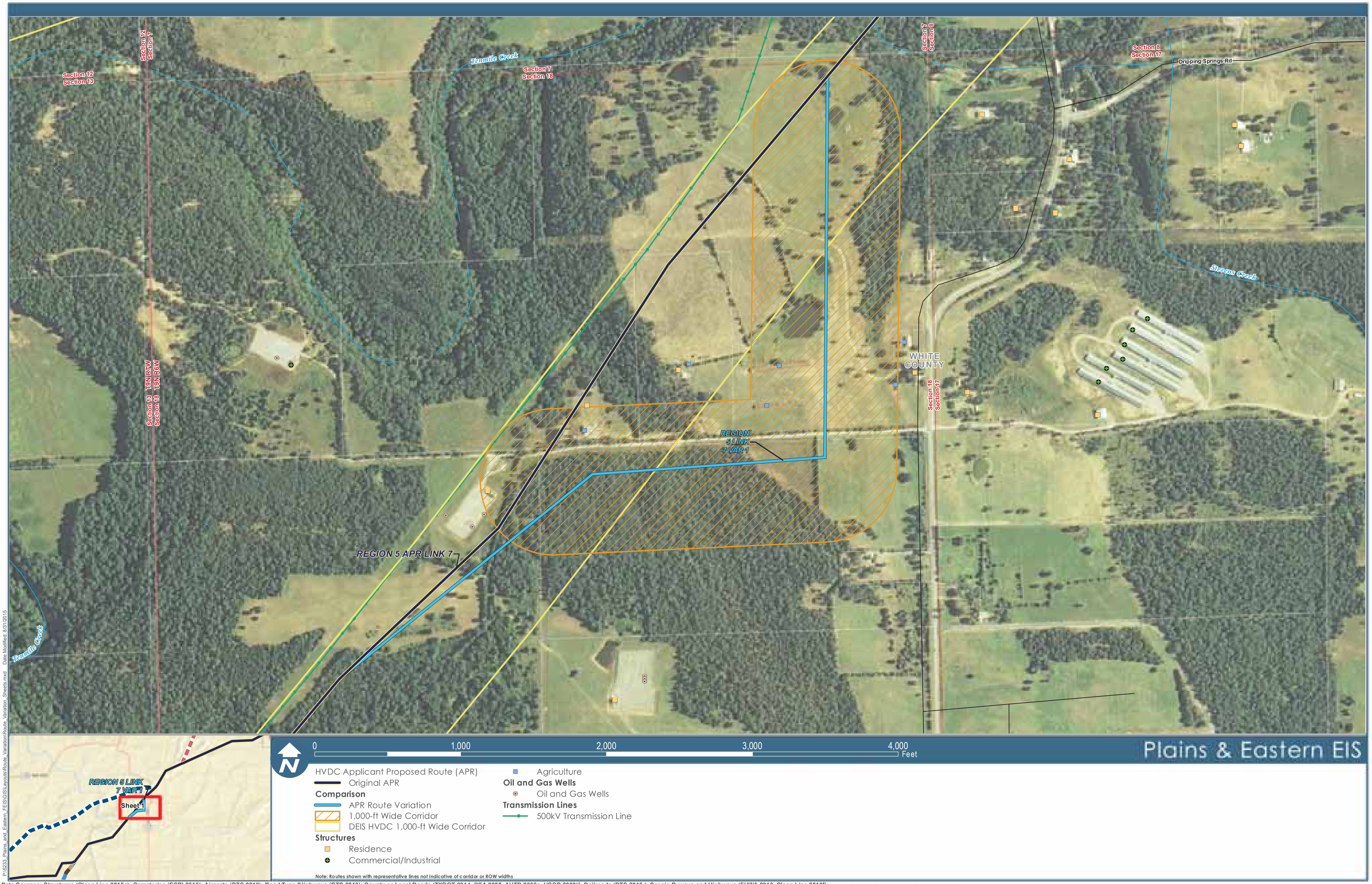
Region 5 Links 3 and 4 Variation 2 Sheet 3



Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*

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Region 5 Link 7 Variation 1 Sheet 1

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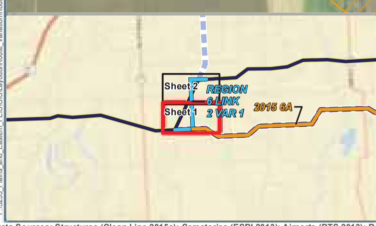

Plains & Eastern EIS

HVDC Applicant Proposed Route (APR)
Original APR
Link Node

Comparison
APR Route Variation
Alternative Route Adjustment
1,000-ft Wide Corridor
DEIS HVDC 1,000-ft Wide Corridor

Region 6 HVDC Alternative Routes
AR 6-A

Note: Routes shown with representative lines not indicative of corridor or ROW widths

Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
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Region 6 Link 2 Variation 1 Sheet 1

Plains & Eastern EIS

0 1,000 2,000 3,000 4,000 Feet

HVDC Applicant Proposed Route (APR)
- Original APR
- Link Node

Comparison
- APR Route Variation
- 1,000-ft Wide Corridor
- DEIS HVDC 1,000-ft Wide Corridor

Region 6 HVDC Alternative Routes
- AR 6-B

Structures
- Residence
- Agriculture

Note: Routes shown with representative lines not indicative of corridor or ROW widths

Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
*References have been provided for all data sources on the aerial maps. Not all data sources are contained within each region or on each map within a region.

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Region 6 Link 2 Variation 1 Sheet 2

0 1,000 2,000 3,000 4,000 Feet

Plains & Eastern EIS

HVDC Applicant Proposed Route (APR)
- Original APR

Comparison
- APR Route Variation
- 1,000-ft Wide Corridor
- DEIS HVDC 1,000-ft Wide Corridor

Structures
- Residence
- Agriculture

Transmission Lines
- 161kV Transmission Line

Note: Routes shown with representative lines not indicative of corridor or ROW widths

Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
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Region 7 Link 1 Variation 1 Sheet 1

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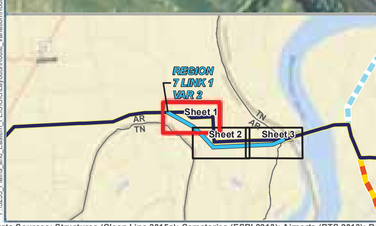

HVDC Applicant Proposed Route (APR)

Original APR

Comparison

APR Route Variation

1,000-ft Wide Corridor

DEIS HVDC 1,000-ft Wide Corridor

Note: Routes shown with representative lines not indicative of corridor or ROW widths

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Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*

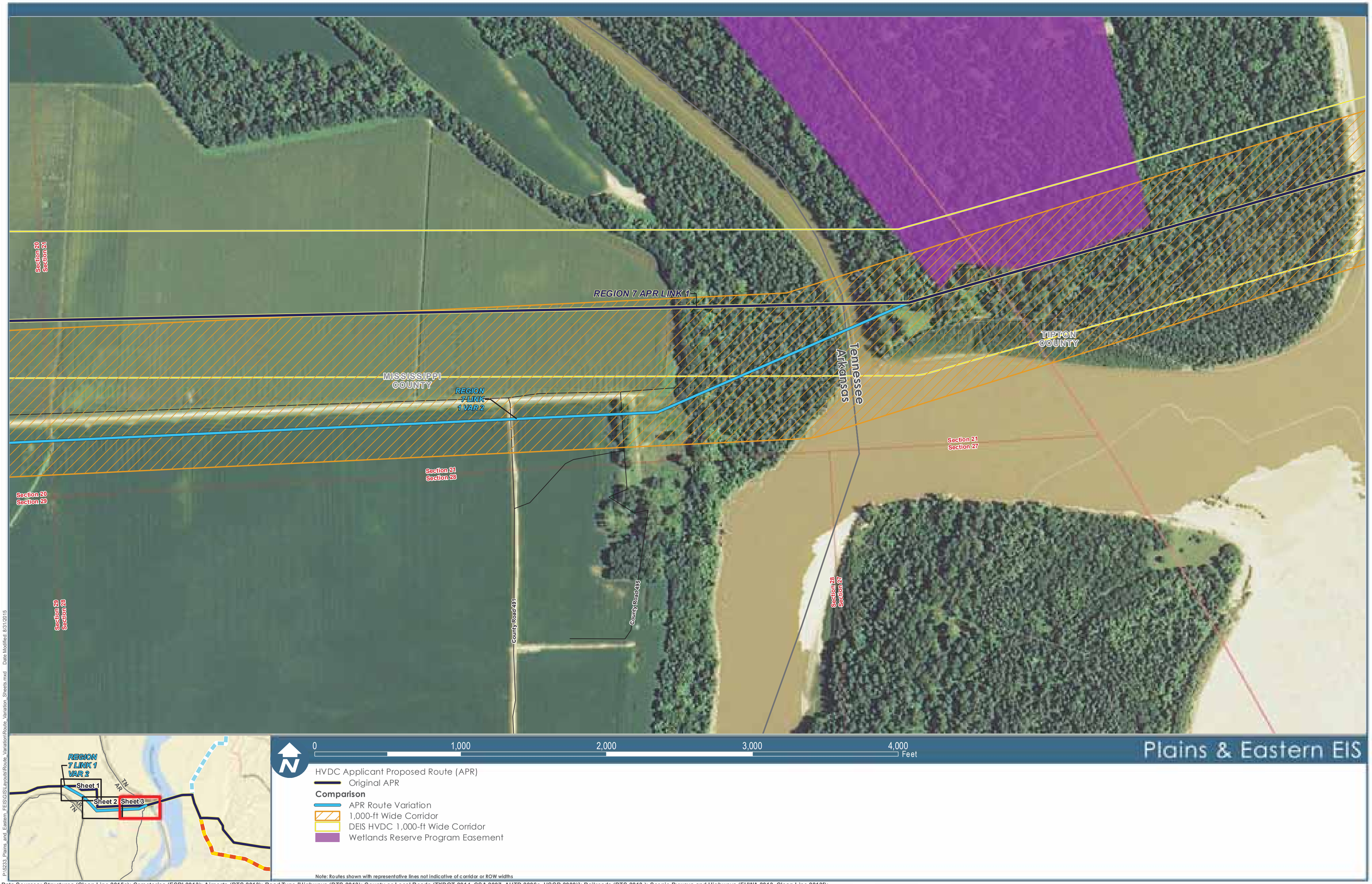
*References have been provided for all data sources on the aerial maps. Not all data sources are contained within each region or on each map within a region.

Region 7 Link 1 Variation 2 Sheet 1

P:\15233_Plains_and_Eastern_FEIS\GIS\Layouts\Route_Variation\Route_Variation_Sheets.mxd Date Modified: 8/31/2015

Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
*References have been provided for all data sources on the aerial maps. Not all data sources are contained within each region or on each map within a region.

Region 7 Link 1 Variation 2 Sheet 2

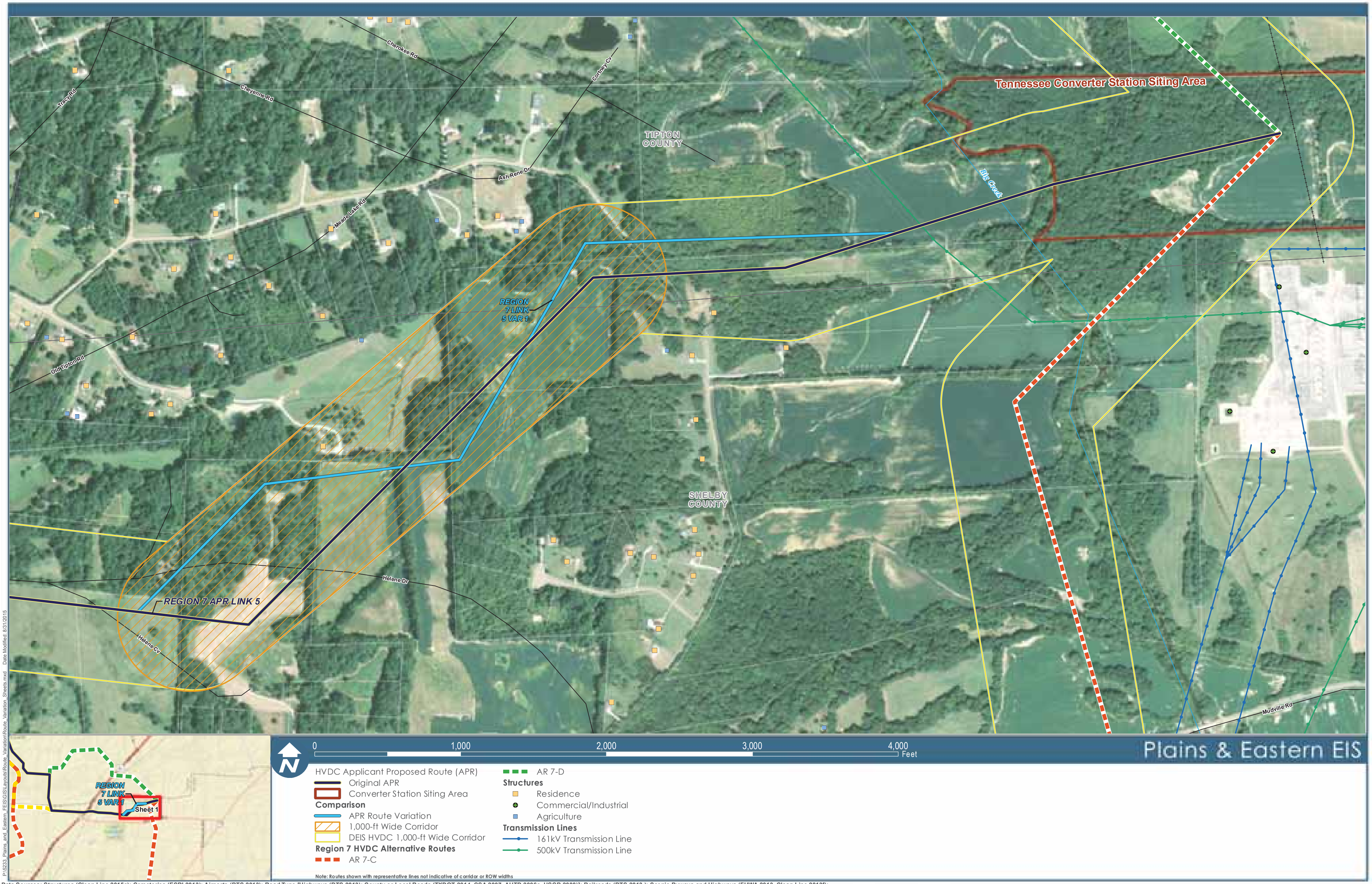


P:\5233_Plains_and_Eastern_FEIS\GIS\Layouts\Route_Variation\Route_Variation_Sheets.mxd Date Modified: 8/31/2015

Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*

*References have been provided for all data sources on the aerial maps. Not all data sources are contained within each region or on each map within a region.

Region 7 Link 1 Variation 2 Sheet 3



Data Sources: Structures (Clean Line 2015a); Cemeteries (ESRI 2013); Airports (BTS 2013); Road Type [Highways (BTS 2013); County or Local Roads (TXDOT 2014, CSA 2007, AHTD 2006a, USCB 2000)]; Railroads (BTS 2013); Scenic Byways and Highways (FHWA 2013, Clean Line 2013f); Transmission Lines (Clean Line 2013c); Oil and Gas Wells (AOGC 2015, OCC 2015); Wild and Scenic Rivers (IWSRCC 1999); Streams (USGS 2004b); Jurisdiction (TPWD 2012, USGS 2012, AHTD 2006c, AGFC 2014, TWRA 2007); USFWS Approved Acquisition Area (USFWS 2014c); USFWS-owned Land (USFWS 2014d); USFS Administrative Forest Boundary (USFS 2014a); USFS-owned Land (USFS 2014c); Wilderness Area (USFS 2014b); The Nature Conservancy (TNC 2013); National Conservation Easement Database (NCED 2014); Historic Trails (NPS 2013); Aerial Photography (NAIP 2013a, NAIP 2013b, NAIP 2014a, NAIP 2014b)*
*References have been provided for all data sources on the aerial maps. Not all data sources are contained within each region or on each map within a region.

Region 7 Link 5 Variation 1 Sheet 1

Exhibit 2, 1,000-Foot-Wide Route Variation Tables

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Environmental and Infrastructure Data

Based on1000ft ROI

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Link Names (do not compare*)	Region 2 Link 1 Var 1	Region 2 Link 2 Var 2
Overview		
Total Length (mi)	2.50	9.81
Total Acreage (ROI -1000 ft)	284.65	1170.75
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	7	37
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	1	1
Road Parallel (mi)	0.00	0.47
All Road Crossings (count)	2	13
Interstate, US, & State Highway Crossings (count)	1	2
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	2	1
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.00	0.47
NLCD 2011 Land Cover (acres)		
Pasture/Hay	0.00	0.00
Barren Land	0.00	0.00
Grassland Herbaceous	260.73	288.43
Shrub/Scrub	0.04	0.00
Cultivated Crops	0.00	844.98
Total Agricultural and Open Lands	260.77	1133.41
Forested Areas	9.66	2.60
Urban/Developed Areas	10.90	23.87
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	0	1
250 - 500 ft	0	1
500 - 1000 ft	3	8
Agricultural, Commercial, Industrial		
0-100 ft	0	1
100-250 ft	0	1
250 - 500 ft	0	2

* Information for the 1,000-foot corridor for two route variations are provided side by side for convenience but are not intended for comparison in this exhibit (Exhibit 2).

	Region 2 Link 1 Var 1	Region 2 Link 2 Var 2
Structure Proximities (cont'd)		
500 - 1000 ft	2	7
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	14.08	659.44
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.07	0.00
Karst Areas (acres)	0.00	156.10
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	284.59	1170.51
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	0.00	0.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	0.00	44.95
High Wind Erosion Potential	54.06	113.74
Shallow Bedrock	0.00	10.16
Hydric Soils	0.00	0.00
Stony Soils	0.00	0.00
High Corrosion Potential	0.00	61.25
High Compaction Potential	0.00	149.26
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	24.43	0.00
SGP CHAT -- Rank 1 (acres)	50.34	0.00
SGP CHAT -- Rank 2&3 (acres)	3.71	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	27.25	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	30.97	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	0.00	0.00
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.00	0.00
NWI Forested Wetlands (count)	1	1
NWI Non-Forested Wetlands (count)	0	2
NWI Forested Crossings >1,000 ft	0	0

	Region 2 Link 1 Var 1	Region 2 Link 2 Var 2
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.13	0.43

NWI Non-Forested Wetlands (acres)	0.00	0.62
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.00
Floodplains (count)	0	0
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	54.06	7.49
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	2	5
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	1
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	13.23	878.49
Class B	261.75	289.46
Class C	9.67	2.80
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	1	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Environmental and
Infrastructure Data
Based on1000ft ROI

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Link Names (do not compare)	Region 3 Link 1 Var 2	Region 3 Link 1 and 2 Var 1
Overview		
Total Length (mi)	3.84	2.91
Total Acreage (ROI -1000 ft)	449.06	334.89
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	17	30
Existing Transmission Parallel (mi)	0.00	0.01
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.09	0.06
All Road Crossings (count)	3	3
Interstate, US, & State Highway Crossings (count)	0	1
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	1	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.09	0.07
NLCD 2011 Land Cover (acres)		
Pasture/Hay	0.00	15.70
Barren Land	0.00	0.00
Grassland Herbaceous	320.39	268.93
Shrub/Scrub	0.00	0.00
Cultivated Crops	7.51	0.00
Total Agricultural and Open Lands	327.91	284.63
Forested Areas	111.84	28.21
Urban/Developed Areas	6.78	13.71
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	0	2
250 - 500 ft	0	8
500 - 1000 ft	4	12
Agricultural, Commercial, Industrial		
0-100 ft	1	1
100-250 ft	0	1
250 - 500 ft	1	2

	Region 3 Link 1 Var 2	Region 3 Link 1 and 2 Var 1
Structure Proximities (cont'd)		
500 - 1000 ft	5	11
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	194.36	167.26
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.39	0.00
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	448.97	334.82
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	0.00	0.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	19.45	23.17
High Wind Erosion Potential	36.92	12.17
Shallow Bedrock	11.05	1.36
Hydric Soils	0.00	0.00
Stony Soils	0.00	0.00
High Corrosion Potential	39.57	32.12
High Compaction Potential	75.46	53.34
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	41.53	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	0.00	0.00
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.20	0.36
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 3 Link 1 Var 2	Region 3 Link 1 and 2 Var 1
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00
NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.32
Floodplains (count)	0	1
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	37.97
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	2
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	16.15	17.35
Class B	321.38	284.44
Class C	108.87	28.60
Class W	2.67	4.49
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	1
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Environmental and Infrastructure Data

Based on1000ft ROI

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Link Names (do not compare)	Region 3 Link 4 Var 1	Region 3 Link 4 Var 2
Overview		
Total Length (mi)	1.12	1.19
Total Acreage (ROI -1000 ft)	117.77	126.40
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	6	7
Existing Transmission Parallel (mi)	0.30	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.00	0.48
All Road Crossings (count)	0	2
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.30	0.48
NLCD 2011 Land Cover (acres)		
Pasture/Hay	0.04	6.65
Barren Land	0.00	0.00
Grassland Herbaceous	104.65	84.48
Shrub/Scrub	0.00	0.00
Cultivated Crops	0.00	0.00
Total Agricultural and Open Lands	104.69	91.14
Forested Areas	5.60	29.78
Urban/Developed Areas	1.91	5.46
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	1	0
500 - 1000 ft	6	0
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	3	0

	Region 3 Link 4 Var 1	Region 3 Link 4 Var 2
Structure Proximities (cont'd)		
500 - 1000 ft	4	1
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	19.28	90.33
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.00	0.00
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	117.75	126.37
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	0.00	0.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	4.39	6.55
High Wind Erosion Potential	0.00	10.33
Shallow Bedrock	0.00	9.53
Hydric Soils	0.00	0.00
Stony Soils	0.00	3.36
High Corrosion Potential	12.75	6.50
High Compaction Potential	19.65	9.90
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	11.20
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	0.00	0.00
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.02	0.00
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 3 Link 4 Var 1	Region 3 Link 4 Var 2
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00

NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.00
Floodplains (count)	0	0
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	3	1
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	1
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	1	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	2.14	5.18
Class B	104.69	92.91
Class C	5.06	28.30
Class W	5.89	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	1	0
FAA Private Airports & Heliports (count 25,000 ft)	3	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Environmental and
Infrastructure Data
Based on1000ft ROI

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Link Name	Region 3 Link 5 Var 2	
Overview		
Total Length (mi)	2.64	
Total Acreage (ROI -1000 ft)	303.22	
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	10	
Existing Transmission Parallel (mi)	0.00	
Existing Transmission Crossings (count)	2	
Road Parallel (mi)	0.22	
All Road Crossings (count)	2	
Interstate, US, & State Highway Crossings (count)	0	
Pipeline Parallel (mi)	0.00	
Pipeline Crossings (count)	0	
Railroad Crossings (count)	0	
Total Paralleling Existing Linear Infrastructure (mi)	0.22	
NLCD 2011 Land Cover (acres)		
Pasture/Hay	127.56	
Barren Land	0.00	
Grassland Herbaceous	105.80	
Shrub/Scrub	0.00	
Cultivated Crops	0.00	
Total Agricultural and Open Lands	233.35	
Forested Areas	63.24	
Urban/Developed Areas	4.64	
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	
100-250 ft	0	
250 - 500 ft	0	
500 - 1000 ft	0	
Churches		
0-100 ft	0	
100-250 ft	0	
250 - 500 ft	0	
500 - 1000 ft	0	
Hospitals		
0-100 ft	0	
100-250 ft	0	
250 - 500 ft	0	
500 - 1000 ft	0	
Residences		
0-100 ft	2	
100-250 ft	1	
250 - 500 ft	1	
500 - 1000 ft	6	
Agricultural, Commercial, Industrial		
0-100 ft	1	
100-250 ft	0	
250 - 500 ft	0	

	Region 3 Link 5 Var 2	Region 3 Link 5 Var 2
Structure Proximities (cont'd)		
500 - 1000 ft	1	
Government Jurisdictions (acres)		
Cities & Towns	0.00	
National Forest - Admin Boundary	0.00	
National Forest - Federal-Owned	0.00	
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	
National Parks	0.00	
USACE Lands	0.00	
DOD Lands	0.00	
State Parks		
Oklahoma State Parks	0.00	
Arkansas State Parks	0.00	
Tennessee State Parks	0.00	
State-Owned WMA's		
Oklahoma WMA's	0.00	
Tennessee WMA's	0.00	
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	
Arkansas Natural Areas	0.00	
Tennessee Natural Areas	0.00	
County, Municipal Conservation Areas	0.00	
Tribal Trust Lands and Allotments	0.00	
Conservation Easements (acres)		
Federal Conservation Easements	0.00	
State Conservation Easements	0.00	
The Nature Conservancy Easments	0.00	
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	266.32	
Farmlands of Statewide Importance (acres)	0.00	
Slopes Greater than 20% (acres)	0.00	
Karst Areas (acres)	0.00	
Landslide Incidence - High (acres)	0.00	
Landslide Incidence - Moderate (acres)	0.00	
Landslide Incidence - Low (acres)	303.16	
Landslide Suceptibility - High (acres)	0.00	
Landslide Suceptibility - Moderate (acres)	0.00	
Mineral Plants - Count 1000 ft	0	
Fault Lines - Total Crossed	0	
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	
Soil Limitations (acres)		
High Water Erosion Potential	11.21	
High Wind Erosion Potential	3.15	
Shallow Bedrock	0.00	
Hydric Soils	0.00	
Stony Soils	0.00	
High Corrosion Potential	13.75	
High Compaction Potential	57.95	
Shale Plays (acres)	0.00	
Biological Resources		
Designated Critical Habitat (acres)	0.00	
Native Prairies (acres)	0.00	
SGP CHAT -- Rank 1 (acres)	0.00	
SGP CHAT -- Rank 2&3 (acres)	0.00	
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	
LPC Lek (acres)	0.00	
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	
Gray Bat Potential Occurrence Area (acres)	0.00	
Indiana Bat Potential Occurrence Area (acres)	0.00	
Whooping Crane Sitings (count 1 mile)	0	
ABB Potential Occurrence Area (acres)	0.00	
Water Resources		
NHD Flowlines (mileage withing ROW)	0.05	
NWI Forested Wetlands (count)	0	
NWI Non-Forested Wetlands (count)	0	
NWI Forested Crossings >1,000 ft	0	

	Region 3 Link 5 Var 2	
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	
NWI Forested Wetlands (acres)	0.00	

NWI Non-Forested Wetlands (acres)	0.00	
NLCD Forested Wetlands (count)	0	
NLCD Non-Forested Wetlands (count)	0	
NLCD Forested Crossings > 1,000 ft (count)	0	
NLCD Non-Forested Crossings > 1,000 ft (count)	0	
NLCD Forested Wetlands Acres	0.00	
NLCD Non-Forested Wetlands Acres	0.00	
Floodplains (acres)	0.00	
Floodplains (count)	0	
Floodplains - Crossings > 1,000 ft (count)	0	
Major Waterbodies (count)	0	
State-Designated Waterbodies (count)	0	
Other Waterbodies (count)	1	
Nutrient Vulnerable Groundwater (acres)	0.00	
Wellhead Protection Areas (acres)	0.00	
Groundwater Wells (count 1000 ft)	0	
National Rivers Inventory (count)	0	
Special Source Groundwater (acres)	0.00	
Springs 0 - 250 ft (count)	0	
Springs 250 - 500 ft (count)	0	
Wild and Scenic Rivers (count)	0	
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	1	
NRHP Listed Sites (count 1000 ft)	0	
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	
GLO Sites (count 1000 ft)	0	
Historical Sites (count 1000 ft)	0	
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	
Cemeteries (count 1000 ft)	0	
Cultural Resource Land Cover (acres)		
Class A	4.53	
Class B	231.56	
Class C	65.53	
Class W	1.61	
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	1	
FAA Private Airports & Heliports (count 25,000 ft)	0	
Private Airstrips (count 1 mile)	0	
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	

Environmental and Infrastructure Data

Based on1000ft ROI

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Link Names (do not compare)	Region 4 Link 3 Var 1	Region 4 Link 3 Var 2
Overview		
Total Length (mi)	2.28	7.25
Total Acreage (ROI -1000 ft)	258.58	861.09
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	25	28
Existing Transmission Parallel (mi)	0.00	8.32
Existing Transmission Crossings (count)	0	2
Road Parallel (mi)	0.04	0.52
All Road Crossings (count)	2	10
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.04	8.85
NLCD 2011 Land Cover (acres)		
Pasture/Hay	216.56	386.93
Barren Land	0.00	0.00
Grassland Herbaceous	0.00	53.24
Shrub/Scrub	7.51	31.93
Cultivated Crops	0.00	4.21
Total Agricultural and Open Lands	224.07	476.32
Forested Areas	26.65	367.93
Urban/Developed Areas	6.81	16.39
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	1	0
100-250 ft	0	0
250 - 500 ft	2	2
500 - 1000 ft	7	11
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	2

	Region 4 Link 3 Var 1	Region 4 Link 3 Var 2
Structure Proximities (cont'd)		
500 - 1000 ft	7	4
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	1.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	136.97	273.13
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.00	5.08
Karst Areas (acres)	0.00	512.82
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	259.00	861.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	20.65	47.67
High Wind Erosion Potential	5.09	0.00
Shallow Bedrock	13.13	88.58
Hydric Soils	0.00	0.00
Stony Soils	7.12	88.12
High Corrosion Potential	36.62	63.07
High Compaction Potential	41.71	80.80
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	48.83	169.42
Gray Bat Potential Occurrence Area (acres)	48.83	169.42
Indiana Bat Potential Occurrence Area (acres)	0.00	0.00
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.12	0.33
NWI Forested Wetlands (count)	2	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	1	0

	Region 4 Link 3 Var 1	Region 4 Link 3 Var 2
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	1.82	0.00
NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	3.32	15.21
Floodplains (count)	1	3
Floodplains - Crossings > 1,000 ft (count)	1	2
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	0
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	1	1
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	1	0
Cultural Resource Land Cover (acres)		
Class A	6.54	20.15
Class B	224.21	471.59
Class C	27.83	369.35
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	1
Private Airstrips (count 1 mile)	0	1
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Environmental and Infrastructure Data

Based on1000ft ROI

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Link Names (do not compare)	Region 4 Link 3 Var 3	Region 4 Link 6 Var 1
Overview		
Total Length (mi)	3.52	1.28
Total Acreage (ROI -1000 ft)	410.06	136.67
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	28	16
Existing Transmission Parallel (mi)	0.03	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.55	0.09
All Road Crossings (count)	2	1
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.57	0.09
NLCD 2011 Land Cover (acres)		
Pasture/Hay	95.58	59.54
Barren Land	0.00	0.00
Grassland Herbaceous	5.88	0.00
Shrub/Scrub	0.00	0.00
Cultivated Crops	0.00	0.00
Total Agricultural and Open Lands	101.46	59.54
Forested Areas	297.92	74.49
Urban/Developed Areas	8.20	2.61
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	2	0
250 - 500 ft	11	1
500 - 1000 ft	26	9
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	2	0
250 - 500 ft	6	0

	Region 4 Link 3 Var 3	Region 4 Link 6 Var 1
Structure Proximities (cont'd)		
500 - 1000 ft	12	1
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	17.62	53.61
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	20.28	1.78
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	410.00	137.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	0.00	0.00
High Wind Erosion Potential	11.71	9.62
Shallow Bedrock	16.09	0.00
Hydric Soils	0.00	0.00
Stony Soils	54.57	14.87
High Corrosion Potential	72.49	24.45
High Compaction Potential	11.83	0.00
Shale Plays (acres)	3.15	24.45
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	79.27	24.45
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	79.27	24.45
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.24	0.04
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 4 Link 3 Var 3	Region 4 Link 6 Var 1
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00
NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.00
Floodplains (count)	0	0
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	0
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	11.29	2.58
Class B	100.78	60.57
Class C	298.00	73.53
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	1
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Environmental and Infrastructure Data

Based on1000ft ROI

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Link Names (do not compare)	Region 4 Link 6 Var 2	Region 4 Link 6 Var 3
Overview		
Total Length (mi)	2.51	1.14
Total Acreage (ROI -1000 ft)	285.95	119.81
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	23	14
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.63	0.16
All Road Crossings (count)	3	2
Interstate, US, & State Highway Crossings (count)	0	1
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.63	0.16
NLCD 2011 Land Cover (acres)		
Pasture/Hay	190.58	15.10
Barren Land	0.00	0.00
Grassland Herbaceous	0.00	5.91
Shrub/Scrub	0.63	0.00
Cultivated Crops	78.68	0.00
Total Agricultural and Open Lands	269.89	21.01
Forested Areas	0.09	91.78
Urban/Developed Areas	8.70	7.00
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	1
100-250 ft	0	1
250 - 500 ft	1	2
500 - 1000 ft	1	6
Agricultural, Commercial, Industrial		
0-100 ft	0	1
100-250 ft	1	0
250 - 500 ft	1	1

	Region 4 Link 6 Var 2	Region 4 Link 6 Var 3
Structure Proximities (cont'd)		
500 - 1000 ft	2	1
Government Jurisdictions (acres)		
Cities & Towns	1.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	6.26	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	121.31	11.90
Farmlands of Statewide Importance (acres)	78.55	5.71
Slopes Greater than 20% (acres)	0.00	9.07
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	285.89	0.00
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	0.00	120.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	31.66	0.00
High Wind Erosion Potential	22.62	3.45
Shallow Bedrock	0.00	0.00
Hydric Soils	38.76	0.00
Stony Soils	0.00	12.57
High Corrosion Potential	54.31	21.08
High Compaction Potential	54.31	5.04
Shale Plays (acres)	54.31	21.08
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	54.31	21.08
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	54.31	21.08
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.33	0.00
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 4 Link 6 Var 2	Region 4 Link 6 Var 3
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00
NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	32.98	0.00
Floodplains (count)	1	0
Floodplains - Crossings > 1,000 ft (count)	1	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	0
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	95.95	6.71
Class B	189.12	21.83
Class C	0.88	91.27
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Environmental and
Infrastructure Data
Based on1000ft ROI

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Link Name	Region 4 Link 9 Var 1	
Overview		
Total Length (mi)	3.29	
Total Acreage (ROI -1000 ft)	380.54	
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	26	
Existing Transmission Parallel (mi)	0.00	
Existing Transmission Crossings (count)	2	
Road Parallel (mi)	0.58	
All Road Crossings (count)	2	
Interstate, US, & State Highway Crossings (count)	1	
Pipeline Parallel (mi)	0.00	
Pipeline Crossings (count)	1	
Railroad Crossings (count)	0	
Total Paralleling Existing Linear Infrastructure (mi)	0.58	
NLCD 2011 Land Cover (acres)		
Pasture/Hay	235.87	
Barren Land	0.00	
Grassland Herbaceous	14.01	
Shrub/Scrub	0.00	
Cultivated Crops	0.00	
Total Agricultural and Open Lands	249.88	
Forested Areas	108.37	
Urban/Developed Areas	14.98	
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	
100-250 ft	0	
250 - 500 ft	0	
500 - 1000 ft	0	
Churches		
0-100 ft	0	
100-250 ft	0	
250 - 500 ft	0	
500 - 1000 ft	0	
Hospitals		
0-100 ft	0	
100-250 ft	0	
250 - 500 ft	0	
500 - 1000 ft	0	
Residences		
0-100 ft	0	
100-250 ft	0	
250 - 500 ft	1	
500 - 1000 ft	10	
Agricultural, Commercial, Industrial		
0-100 ft	0	
100-250 ft	0	
250 - 500 ft	1	

Structure Proximities (cont'd)		
500 - 1000 ft	6	
Government Jurisdictions (acres)		
Cities & Towns	0.00	
National Forest - Admin Boundary	0.00	
National Forest - Federal-Owned	0.00	
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	
National Parks	0.00	
USACE Lands	0.00	
DOD Lands	0.00	
State Parks		
Oklahoma State Parks	0.00	
Arkansas State Parks	0.00	
Tennessee State Parks	0.00	
State-Owned WMA's		
Oklahoma WMA's	0.00	
Tennessee WMA's	0.00	
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	
Arkansas Natural Areas	0.00	
Tennessee Natural Areas	0.00	
County, Municipal Conservation Areas	0.00	
Tribal Trust Lands and Allotments	0.00	
Conservation Easements (acres)		
Federal Conservation Easements	0.00	
State Conservation Easements	0.00	
The Nature Conservancy Easments	0.00	
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	467.06	
Farmlands of Statewide Importance (acres)	147.76	
Slopes Greater than 20% (acres)	5.16	
Karst Areas (acres)	0.00	
Landslide Incidence - High (acres)	0.00	
Landslide Incidence - Moderate (acres)	0.00	
Landslide Incidence - Low (acres)	0.00	
Landslide Suceptibility - High (acres)	0.00	
Landslide Suceptibility - Moderate (acres)	380.00	
Mineral Plants - Count 1000 ft	0	
Fault Lines - Total Crossed	1	
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	
Soil Limitations (acres)		
High Water Erosion Potential	18.34	
High Wind Erosion Potential	47.55	
Shallow Bedrock	8.22	
Hydric Soils	0.00	
Stony Soils	4.00	
High Corrosion Potential	55.58	
High Compaction Potential	59.33	
Shale Plays (acres)	73.22	
Biological Resources		
Designated Critical Habitat (acres)	0.00	
Native Prairies (acres)	0.00	
SGP CHAT -- Rank 1 (acres)	0.00	
SGP CHAT -- Rank 2&3 (acres)	0.00	
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	
LPC Lek (acres)	0.00	
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	
Gray Bat Potential Occurrence Area (acres)	0.00	
Indiana Bat Potential Occurrence Area (acres)	73.22	
Whooping Crane Sitings (count 1 mile)	0	
ABB Potential Occurrence Area (acres)	0.00	
Water Resources		
NHD Flowlines (mileage withing ROW)	0.55	
NWI Forested Wetlands (count)	0	
NWI Non-Forested Wetlands (count)	0	
NWI Forested Crossings >1,000 ft	0	

	Region 4 Link 9 Var 1	
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	
NWI Forested Wetlands (acres)	0.00	
NWI Non-Forested Wetlands (acres)	0.00	
NLCD Forested Wetlands (count)	0	
NLCD Non-Forested Wetlands (count)	0	
NLCD Forested Crossings > 1,000 ft (count)	0	
NLCD Non-Forested Crossings > 1,000 ft (count)	0	
NLCD Forested Wetlands Acres	0.00	
NLCD Non-Forested Wetlands Acres	0.00	
Floodplains (acres)	43.49	
Floodplains (count)	1	
Floodplains - Crossings > 1,000 ft (count)	1	
Major Waterbodies (count)	1	
State-Designated Waterbodies (count)	0	
Other Waterbodies (count)	1	
Nutrient Vulnerable Groundwater (acres)	0.00	
Wellhead Protection Areas (acres)	0.00	
Groundwater Wells (count 1000 ft)	1	
National Rivers Inventory (count)	1	
Special Source Groundwater (acres)	0.00	
Springs 0 - 250 ft (count)	0	
Springs 250 - 500 ft (count)	0	
Wild and Scenic Rivers (count)	1	
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	
NRHP Listed Sites (count 1000 ft)	0	
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	
GLO Sites (count 1000 ft)	0	
Historical Sites (count 1000 ft)	0	
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	
Cemeteries (count 1000 ft)	1	
Cultural Resource Land Cover (acres)		
Class A	20.44	
Class B	248.90	
Class C	109.55	
Class W	1.65	
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	
FAA Private Airports & Heliports (count 25,000 ft)	0	
Private Airstrips (count 1 mile)	0	
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	

Environmental and
Infrastructure Data
Based on1000ft ROI

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Link Names (do not compare)	Region 5 Link 1 Var 2	Region 5 Link 2 Var 2
Overview		
Total Length (mi)	2.19	2.92
Total Acreage (ROI -1000 ft)	247.17	337.12
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	17	15
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.05	0.23
All Road Crossings (count)	1	0
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.05	0.23
NLCD 2011 Land Cover (acres)		
Pasture/Hay	38.56	36.42
Barren Land	0.00	0.00
Grassland Herbaceous	2.51	2.89
Shrub/Scrub	0.00	1.11
Cultivated Crops	0.00	0.00
Total Agricultural and Open Lands	41.07	40.43
Forested Areas	202.58	295.18
Urban/Developed Areas	0.30	1.43
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	1	1
250 - 500 ft	0	0
500 - 1000 ft	10	1
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	2	0

	Region 5 Link 1 Var 2	Region 5 Link 2 Var 2
Structure Proximities (cont'd)		
500 - 1000 ft	8	0
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	138.86	0.00
Farmlands of Statewide Importance (acres)	17.88	0.00
Slopes Greater than 20% (acres)	9.66	49.68
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	247.00	337.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	1.85	0.00
High Wind Erosion Potential	31.81	26.36
Shallow Bedrock	28.02	58.94
Hydric Soils	0.00	0.00
Stony Soils	12.20	37.06
High Corrosion Potential	34.75	30.78
High Compaction Potential	5.81	0.00
Shale Plays (acres)	46.59	64.65
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	46.59	64.65
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.08	0.34
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 5 Link 1 Var 2	Region 5 Link 2 Var 2
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00
NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	2	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.48	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	6.01	0.00
Floodplains (count)	1	0
Floodplains - Crossings > 1,000 ft (count)	1	0
Major Waterbodies (count)	1	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	1	0
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	1	0
Cultural Resource Land Cover (acres)		
Class A	0.43	1.10
Class B	41.90	39.60
Class C	202.69	296.42
Class W	2.15	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	1	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Environmental and
Infrastructure Data
Based on1000ft ROI

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Link Names (do not compare)	Region 5 Link 2 and 3 Var 1	Region 5 Link 3 and 4 Var 2
Overview		
Total Length (mi)	2.30	4.40
Total Acreage (ROI -1000 ft)	261.07	514.91
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	10	18
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	0	1
Road Parallel (mi)	0.00	0.35
All Road Crossings (count)	2	3
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	1
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.00	0.35
NLCD 2011 Land Cover (acres)		
Pasture/Hay	8.91	90.73
Barren Land	0.00	0.00
Grassland Herbaceous	9.93	42.93
Shrub/Scrub	0.00	0.00
Cultivated Crops	0.00	1.82
Total Agricultural and Open Lands	18.84	135.48
Forested Areas	237.10	361.50
Urban/Developed Areas	5.07	15.34
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	1
100-250 ft	1	1
250 - 500 ft	0	1
500 - 1000 ft	7	3
Agricultural, Commercial, Industrial		
0-100 ft	0	1
100-250 ft	0	1
250 - 500 ft	1	1

	Region 5 Link 2 and 3 Var 1	Region 5 Link 3 and 4 Var 2
Structure Proximities (cont'd)		
500 - 1000 ft	0	1
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	239.53	17.35
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	14.55	7.62
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	261.00	515.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	0.00	0.00
High Wind Erosion Potential	24.71	51.58
Shallow Bedrock	22.22	0.00
Hydric Soils	0.00	0.00
Stony Soils	20.46	45.96
High Corrosion Potential	28.48	97.48
High Compaction Potential	11.15	2.64
Shale Plays (acres)	49.36	100.11
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	49.36	100.11
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.13	0.44
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 5 Link 2 and 3 Var 1	Region 5 Link 3 and 4 Var 2
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00
NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	9.94	0.00
Floodplains (count)	1	0
Floodplains - Crossings > 1,000 ft (count)	1	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	0
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	1
Cultural Resource Land Cover (acres)		
Class A	4.83	20.35
Class B	20.13	129.00
Class C	236.11	365.56
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	1
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Environmental and
Infrastructure Data
Based on1000ft ROI

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Link Name	Region 5 Link 7 Var 1	
Overview		
Total Length (mi)	1.07	
Total Acreage (ROI -1000 ft)	112.13	
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	4	
Existing Transmission Parallel (mi)	0.00	
Existing Transmission Crossings (count)	0	
Road Parallel (mi)	0.00	
All Road Crossings (count)	0	
Interstate, US, & State Highway Crossings (count)	0	
Pipeline Parallel (mi)	0.00	
Pipeline Crossings (count)	0	
Railroad Crossings (count)	0	
Total Paralleling Existing Linear Infrastructure (mi)	0.00	
NLCD 2011 Land Cover (acres)		
Pasture/Hay	59.03	
Barren Land	0.00	
Grassland Herbaceous	0.00	
Shrub/Scrub	0.00	
Cultivated Crops	0.00	
Total Agricultural and Open Lands	59.03	
Forested Areas	52.41	
Urban/Developed Areas	0.55	
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	
100-250 ft	0	
250 - 500 ft	0	
500 - 1000 ft	0	
Churches		
0-100 ft	0	
100-250 ft	0	
250 - 500 ft	0	
500 - 1000 ft	0	
Hospitals		
0-100 ft	0	
100-250 ft	0	
250 - 500 ft	0	
500 - 1000 ft	0	
Residences		
0-100 ft	0	
100-250 ft	0	
250 - 500 ft	1	
500 - 1000 ft	4	
Agricultural, Commercial, Industrial		
0-100 ft	0	
100-250 ft	0	
250 - 500 ft	4	

	Region 5 Link 7 Var 1	
Structure Proximities (cont'd)		
500 - 1000 ft	2	
Government Jurisdictions (acres)		
Cities & Towns	0.00	
National Forest - Admin Boundary	0.00	
National Forest - Federal-Owned	0.00	
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	
National Parks	0.00	
USACE Lands	0.00	
DOD Lands	0.00	
State Parks		
Oklahoma State Parks	0.00	
Arkansas State Parks	0.00	
Tennessee State Parks	0.00	
State-Owned WMA's		
Oklahoma WMA's	0.00	
Tennessee WMA's	0.00	
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	
Arkansas Natural Areas	0.00	
Tennessee Natural Areas	0.00	
County, Municipal Conservation Areas	0.00	
Tribal Trust Lands and Allotments	0.00	
Conservation Easements (acres)		
Federal Conservation Easements	0.00	
State Conservation Easements	0.00	
The Nature Conservancy Easments	0.00	
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	74.93	
Farmlands of Statewide Importance (acres)	2.92	
Slopes Greater than 20% (acres)	3.93	
Karst Areas (acres)	0.00	
Landslide Incidence - High (acres)	0.00	
Landslide Incidence - Moderate (acres)	0.00	
Landslide Incidence - Low (acres)	0.00	
Landslide Suceptibility - High (acres)	0.00	
Landslide Suceptibility - Moderate (acres)	112.00	
Mineral Plants - Count 1000 ft	0	
Fault Lines - Total Crossed	0	
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	
Soil Limitations (acres)		
High Water Erosion Potential	0.00	
High Wind Erosion Potential	15.11	
Shallow Bedrock	3.70	
Hydric Soils	0.00	
Stony Soils	4.48	
High Corrosion Potential	15.90	
High Compaction Potential	0.00	
Shale Plays (acres)	19.71	
Biological Resources		
Designated Critical Habitat (acres)	0.00	
Native Prairies (acres)	0.00	
SGP CHAT -- Rank 1 (acres)	0.00	
SGP CHAT -- Rank 2&3 (acres)	0.00	
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	
LPC Lek (acres)	0.00	
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	
Gray Bat Potential Occurrence Area (acres)	0.00	
Indiana Bat Potential Occurrence Area (acres)	0.00	
Whooping Crane Sitings (count 1 mile)	0	
ABB Potential Occurrence Area (acres)	0.00	
Water Resources		
NHD Flowlines (mileage withing ROW)	0.04	
NWI Forested Wetlands (count)	0	
NWI Non-Forested Wetlands (count)	0	
NWI Forested Crossings >1,000 ft	0	

	Region 5 Link 7 Var 1	
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	
NWI Forested Wetlands (acres)	0.00	
NWI Non-Forested Wetlands (acres)	0.00	
NLCD Forested Wetlands (count)	0	
NLCD Non-Forested Wetlands (count)	0	
NLCD Forested Crossings > 1,000 ft (count)	0	
NLCD Non-Forested Crossings > 1,000 ft (count)	0	
NLCD Forested Wetlands Acres	0.00	
NLCD Non-Forested Wetlands Acres	0.00	
Floodplains (acres)	0.00	
Floodplains (count)	0	
Floodplains - Crossings > 1,000 ft (count)	0	
Major Waterbodies (count)	0	
State-Designated Waterbodies (count)	0	
Other Waterbodies (count)	1	
Nutrient Vulnerable Groundwater (acres)	0.00	
Wellhead Protection Areas (acres)	0.00	
Groundwater Wells (count 1000 ft)	0	
National Rivers Inventory (count)	0	
Special Source Groundwater (acres)	0.00	
Springs 0 - 250 ft (count)	0	
Springs 250 - 500 ft (count)	0	
Wild and Scenic Rivers (count)	0	
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	
NRHP Listed Sites (count 1000 ft)	0	
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	2	
GLO Sites (count 1000 ft)	0	
Historical Sites (count 1000 ft)	0	
Total Recorded Cultural or Historical Sites (count 1000 ft)	2	
Cemeteries (count 1000 ft)	0	
Cultural Resource Land Cover (acres)		
Class A	2.14	
Class B	58.97	
Class C	51.02	
Class W	0.00	
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	
FAA Private Airports & Heliports (count 25,000 ft)	0	
Private Airstrips (count 1 mile)	0	
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	

Environmental and
Infrastructure Data

Based on1000ft ROI

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Link Name	Region 6 Link 2 Var 1	
Overview		
Total Length (mi)	2.57	
Total Acreage (ROI -1000 ft)	295.49	
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	13	
Existing Transmission Parallel (mi)	0.00	
Existing Transmission Crossings (count)	0	
Road Parallel (mi)	0.08	
All Road Crossings (count)	1	
Interstate, US, & State Highway Crossings (count)	0	
Pipeline Parallel (mi)	0.00	
Pipeline Crossings (count)	0	
Railroad Crossings (count)	0	
Total Paralleling Existing Linear Infrastructure (mi)	0.08	
NLCD 2011 Land Cover (acres)		
Pasture/Hay	0.00	
Barren Land	0.00	
Grassland Herbaceous	0.00	
Shrub/Scrub	0.00	
Cultivated Crops	274.01	
Total Agricultural and Open Lands	274.01	
Forested Areas	0.00	
Urban/Developed Areas	6.16	
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	
100-250 ft	0	
250 - 500 ft	0	
500 - 1000 ft	0	
Churches		
0-100 ft	0	
100-250 ft	0	
250 - 500 ft	0	
500 - 1000 ft	0	
Hospitals		
0-100 ft	0	
100-250 ft	0	
250 - 500 ft	0	
500 - 1000 ft	0	
Residences		
0-100 ft	0	
100-250 ft	0	
250 - 500 ft	0	
500 - 1000 ft	0	
Agricultural, Commercial, Industrial		
0-100 ft	0	
100-250 ft	0	
250 - 500 ft	0	

	Region 6 Link 2 Var 1	
Structure Proximities (cont'd)		
500 - 1000 ft	0	
Government Jurisdictions (acres)		
Cities & Towns	0.00	
National Forest - Admin Boundary	0.00	
National Forest - Federal-Owned	0.00	
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	
National Parks	0.00	
USACE Lands	0.00	
DOD Lands	0.00	
State Parks		
Oklahoma State Parks	0.00	
Arkansas State Parks	0.00	
Tennessee State Parks	0.00	
State-Owned WMA's		
Oklahoma WMA's	0.00	
Tennessee WMA's	0.00	
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	
Arkansas Natural Areas	0.00	
Tennessee Natural Areas	0.00	
County, Municipal Conservation Areas	0.00	
Tribal Trust Lands and Allotments	0.00	
Conservation Easements (acres)		
Federal Conservation Easements	0.00	
State Conservation Easements	0.00	
The Nature Conservancy Easments	0.00	
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	87.12	
Farmlands of Statewide Importance (acres)	0.00	
Slopes Greater than 20% (acres)	0.00	
Karst Areas (acres)	0.00	
Landslide Incidence - High (acres)	0.00	
Landslide Incidence - Moderate (acres)	0.00	
Landslide Incidence - Low (acres)	295.43	
Landslide Suceptibility - High (acres)	0.00	
Landslide Suceptibility - Moderate (acres)	0.00	
Mineral Plants - Count 1000 ft	0	
Fault Lines - Total Crossed	0	
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	
Soil Limitations (acres)		
High Water Erosion Potential	46.90	
High Wind Erosion Potential	9.71	
Shallow Bedrock	22.27	
Hydric Soils	0.00	
Stony Soils	0.00	
High Corrosion Potential	46.90	
High Compaction Potential	46.90	
Shale Plays (acres)	0.00	
Biological Resources		
Designated Critical Habitat (acres)	0.00	
Native Prairies (acres)	0.00	
SGP CHAT -- Rank 1 (acres)	0.00	
SGP CHAT -- Rank 2&3 (acres)	0.00	
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	
LPC Lek (acres)	0.00	
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	
Gray Bat Potential Occurrence Area (acres)	0.00	
Indiana Bat Potential Occurrence Area (acres)	56.61	
Whooping Crane Sitings (count 1 mile)	0	
ABB Potential Occurrence Area (acres)	0.00	
Water Resources		
NHD Flowlines (mileage withing ROW)	0.43	
NWI Forested Wetlands (count)	2	
NWI Non-Forested Wetlands (count)	1	
NWI Forested Crossings >1,000 ft	1	

	Region 6 Link 2 Var 1	
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	
NWI Forested Wetlands (acres)	0.88	
NWI Non-Forested Wetlands (acres)	0.33	
NLCD Forested Wetlands (count)	4	
NLCD Non-Forested Wetlands (count)	0	
NLCD Forested Crossings > 1,000 ft (count)	1	
NLCD Non-Forested Crossings > 1,000 ft (count)	0	
NLCD Forested Wetlands Acres	1.56	
NLCD Non-Forested Wetlands Acres	0.00	
Floodplains (acres)	0.00	
Floodplains (count)	0	
Floodplains - Crossings > 1,000 ft (count)	0	
Major Waterbodies (count)	0	
State-Designated Waterbodies (count)	0	
Other Waterbodies (count)	0	
Nutrient Vulnerable Groundwater (acres)	0.00	
Wellhead Protection Areas (acres)	0.00	
Groundwater Wells (count 1000 ft)	3	
National Rivers Inventory (count)	0	
Special Source Groundwater (acres)	0.00	
Springs 0 - 250 ft (count)	0	
Springs 250 - 500 ft (count)	0	
Wild and Scenic Rivers (count)	0	
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	
NRHP Listed Sites (count 1000 ft)	0	
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	
GLO Sites (count 1000 ft)	0	
Historical Sites (count 1000 ft)	0	
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	
Cemeteries (count 1000 ft)	0	
Cultural Resource Land Cover (acres)		
Class A	280.34	
Class B	0.00	
Class C	15.16	
Class W	0.00	
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	
FAA Private Airports & Heliports (count 25,000 ft)	0	
Private Airstrips (count 1 mile)	0	
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	

Environmental and Infrastructure Data

Based on1000ft ROI

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Link Names (do not compare)	Region 7 Link 1 Var 1	Region 7 Link 1 Var 2
Overview		
Total Length (mi)	0.95	5.88
Total Acreage (ROI -1000 ft)	98.04	694.60
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	10	18
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.00	1.30
All Road Crossings (count)	0	3
Interstate, US, & State Highway Crossings (count)	0	1
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.00	1.30
NLCD 2011 Land Cover (acres)		
Pasture/Hay	0.00	6.67
Barren Land	0.00	2.49
Grassland Herbaceous	0.00	0.89
Shrub/Scrub	0.00	0.00
Cultivated Crops	97.90	402.50
Total Agricultural and Open Lands	97.90	412.55
Forested Areas	0.00	4.92
Urban/Developed Areas	0.00	21.25
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	1	1
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0

	Region 7 Link 1 Var 1	Region 7 Link 1 Var 2
Structure Proximities (cont'd)		
500 - 1000 ft	2	0
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	10.39
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	0.00	42.49
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.00	0.00
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	98.02	694.45
Landslide Suceptibility - Moderate (acres)	0.00	0.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	98.02	694.45
Soil Limitations (acres)		
High Water Erosion Potential	0.00	20.27
High Wind Erosion Potential	0.00	31.35
Shallow Bedrock	0.00	0.00
Hydric Soils	16.92	21.56
Stony Soils	0.00	0.00
High Corrosion Potential	16.92	93.68
High Compaction Potential	16.92	84.03
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	0.00	0.00
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.00	1.87
NWI Forested Wetlands (count)	0	18
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	9

	Region 7 Link 1 Var 1	Region 7 Link 1 Var 2
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	29.94
NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	13
NLCD Non-Forested Wetlands (count)	0	1
NLCD Forested Crossings > 1,000 ft (count)	0	5
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	38.75
NLCD Non-Forested Wetlands Acres	0.00	1.19
Floodplains (acres)	0.00	167.48
Floodplains (count)	0	6
Floodplains - Crossings > 1,000 ft (count)	0	3
Major Waterbodies (count)	0	2
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	2
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	1	1
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	98.04	428.21
Class B	0.00	10.87
Class C	0.00	176.54
Class W	0.00	78.98
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	1

Environmental and
Infrastructure Data
Based on1000ft ROI

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Alternative Route Adjustment		FEIS AR 3A-adj
Overview		
Total Length (mi)		0.71
Total Acreage (ROI -1000 ft)		68.14
Parcels & Infrastructure Parallel		
Parcels Crossed (count)		6
Existing Transmission Parallel (mi)		0.00
Existing Transmission Crossings (count)		1
Road Parallel (mi)		0.03
All Road Crossings (count)		1
Interstate, US, & State Highway Crossings (count)		0
Pipeline Parallel (mi)		0.00
Pipeline Crossings (count)		1
Railroad Crossings (count)		0
Total Paralleling Existing Linear Infrastructure (mi)		0.03
NLCD 2011 Land Cover (acres)		
Pasture/Hay		0.00
Barren Land		0.00
Grassland Herbaceous		61.35
Shrub/Scrub		0.00
Cultivated Crops		0.00
Total Agricultural and Open Lands		61.35
Forested Areas		2.89
Urban/Developed Areas		2.26
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft		0
100-250 ft		0
250 - 500 ft		0
500 - 1000 ft		0
Churches		
0-100 ft		0
100-250 ft		0
250 - 500 ft		0
500 - 1000 ft		0
Hospitals		
0-100 ft		0
100-250 ft		0
250 - 500 ft		0
500 - 1000 ft		0
Residences		
0-100 ft		0
100-250 ft		0
250 - 500 ft		1
500 - 1000 ft		0
Agricultural, Commercial, Industrial		
0-100 ft		0
100-250 ft		0
250 - 500 ft		1

Structure Proximities (cont'd)		
500 - 1000 ft		1
Government Jurisdictions (acres)		
Cities & Towns		0.00
National Forest - Admin Boundary		0.00
National Forest - Federal-Owned		0.00
National Wildlife Refuges Aquistion Boundary (USFWS)		0.00
National Parks		0.00
USACE Lands		0.00
DOD Lands		0.00
State Parks		
Oklahoma State Parks		0.00
Arkansas State Parks		0.00
Tennessee State Parks		0.00
State-Owned WMA's		
Oklahoma WMA's		0.00
Tennessee WMA's		0.00
Arkansas Leased WMA's		
Oklahoma School Lands		0.00
Arkansas Natural Areas		0.00
Tennessee Natural Areas		0.00
County, Municipal Conservation Areas		0.00
Tribal Trust Lands and Allotments		0.00
Conservation Easements (acres)		
Federal Conservation Easements		0.00
State Conservation Easements		0.00
The Nature Conservancy Easments		0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)		25.68
Farmlands of Statewide Importance (acres)		0.00
Slopes Greater than 20% (acres)		0.00
Karst Areas (acres)		0.00
Landslide Incidence - High (acres)		0.00
Landslide Incidence - Moderate (acres)		0.00
Landslide Incidence - Low (acres)		68.13
Landslide Suceptibility - High (acres)		0.00
Landslide Suceptibility - Moderate (acres)		0.00
Mineral Plants - Count 1000 ft		0
Fault Lines - Total Crossed		0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9		0
Earthquake Epicenters - Count 1000 ft: Class > 4.0		0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)		0.00
Soil Limitations (acres)		
High Water Erosion Potential		0.00
High Wind Erosion Potential		0.00
Shallow Bedrock		0.00
Hydric Soils		0.00
Stony Soils		0.00
High Corrosion Potential		3.79
High Compaction Potential		10.74
Shale Plays (acres)		0.00
Biological Resources		
Designated Critical Habitat (acres)		0.00
Native Prairies (acres)		0.00
SGP CHAT -- Rank 1 (acres)		0.00
SGP CHAT -- Rank 2&3 (acres)		0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)		0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)		0.00
LPC Lek (acres)		0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)		0.00
Gray Bat Potential Occurrence Area (acres)		0.00
Indiana Bat Potential Occurrence Area (acres)		0.00
Whooping Crane Sitings (count 1 mile)		0
ABB Potential Occurrence Area (acres)		0.00
Water Resources		
NHD Flowlines (mileage withing ROW)		0.00
NWI Forested Wetlands (count)		0
NWI Non-Forested Wetlands (count)		0
NWI Forested Crossings >1,000 ft		0

Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft		0
NWI Forested Wetlands (acres)		0.00
NWI Non-Forested Wetlands (acres)		0.00
NLCD Forested Wetlands (count)		0
NLCD Non-Forested Wetlands (count)		0
NLCD Forested Crossings > 1,000 ft (count)		0
NLCD Non-Forested Crossings > 1,000 ft (count)		0
NLCD Forested Wetlands Acres		0.00
NLCD Non-Forested Wetlands Acres		0.00
Floodplains (acres)		0.00
Floodplains (count)		0
Floodplains - Crossings > 1,000 ft (count)		0
Major Waterbodies (count)		0
State-Designated Waterbodies (count)		0
Other Waterbodies (count)		0
Nutrient Vulnerable Groundwater (acres)		5.84
Wellhead Protection Areas (acres)		0.00
Groundwater Wells (count 1000 ft)		0
National Rivers Inventory (count)		0
Special Source Groundwater (acres)		0.00
Springs 0 - 250 ft (count)		0
Springs 250 - 500 ft (count)		0
Wild and Scenic Rivers (count)		0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)		0
NRHP Listed Sites (count 1000 ft)		0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)		0
GLO Sites (count 1000 ft)		0
Historical Sites (count 1000 ft)		0
Total Recorded Cultural or Historical Sites (count 1000 ft)		0
Cemeteries (count 1000 ft)		0
Cultural Resource Land Cover (acres)		
Class A		2.26
Class B		61.79
Class C		2.89
Class W		1.20
Aviation Facilities		
FAA Public Airports (count 25,000 ft)		0
FAA Private Airports & Heliports (count 25,000 ft)		0
Private Airstrips (count 1 mile)		1
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)		0

Environmental and
Infrastructure Data
Based on1000ft ROI

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Alternative Route Adjustment		FEIS AR 5B-adj
Overview		
Total Length (mi)		1.26
Total Acreage (ROI -1000 ft)		135.06
Parcels & Infrastructure Parallel		
Parcels Crossed (count)		6
Existing Transmission Parallel (mi)		0.00
Existing Transmission Crossings (count)		0
Road Parallel (mi)		0.00
All Road Crossings (count)		0
Interstate, US, & State Highway Crossings (count)		0
Pipeline Parallel (mi)		0.00
Pipeline Crossings (count)		0
Railroad Crossings (count)		0
Total Paralleling Existing Linear Infrastructure (mi)		0.00
NLCD 2011 Land Cover (acres)		
Pasture/Hay		17.58
Barren Land		0.00
Grassland Herbaceous		1.78
Shrub/Scrub		9.09
Cultivated Crops		0.00
Total Agricultural and Open Lands		28.45
Forested Areas		104.80
Urban/Developed Areas		0.00
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft		0
100-250 ft		0
250 - 500 ft		0
500 - 1000 ft		0
Churches		
0-100 ft		0
100-250 ft		0
250 - 500 ft		0
500 - 1000 ft		0
Hospitals		
0-100 ft		0
100-250 ft		0
250 - 500 ft		0
500 - 1000 ft		0
Residences		
0-100 ft		0
100-250 ft		0
250 - 500 ft		0
500 - 1000 ft		1
Agricultural, Commercial, Industrial		
0-100 ft		0
100-250 ft		0
250 - 500 ft		0

Structure Proximities (cont'd)		
500 - 1000 ft		0
Government Jurisdictions (acres)		
Cities & Towns		0.00
National Forest - Admin Boundary		0.00
National Forest - Federal-Owned		0.00
National Wildlife Refuges Aquistion Boundary (USFWS)		0.00
National Parks		0.00
USACE Lands		0.00
DOD Lands		0.00
State Parks		
Oklahoma State Parks		0.00
Arkansas State Parks		0.00
Tennessee State Parks		0.00
State-Owned WMA's		
Oklahoma WMA's		0.00
Tennessee WMA's		0.00
Arkansas Leased WMA's		
Oklahoma School Lands		0.00
Arkansas Natural Areas		0.00
Tennessee Natural Areas		0.00
County, Municipal Conservation Areas		0.00
Tribal Trust Lands and Allotments		0.00
Conservation Easements (acres)		
Federal Conservation Easements		0.00
State Conservation Easements		0.00
The Nature Conservancy Easments		0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)		108.34
Farmlands of Statewide Importance (acres)		0.00
Slopes Greater than 20% (acres)		9.23
Karst Areas (acres)		0.00
Landslide Incidence - High (acres)		0.00
Landslide Incidence - Moderate (acres)		0.00
Landslide Incidence - Low (acres)		0.00
Landslide Suceptibility - High (acres)		0.00
Landslide Suceptibility - Moderate (acres)		135.00
Mineral Plants - Count 1000 ft		0
Fault Lines - Total Crossed		0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9		0
Earthquake Epicenters - Count 1000 ft: Class > 4.0		0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)		0.00
Soil Limitations (acres)		
High Water Erosion Potential		0.00
High Wind Erosion Potential		2.19
Shallow Bedrock		11.21
Hydric Soils		0.00
Stony Soils		12.06
High Corrosion Potential		8.48
High Compaction Potential		4.42
Shale Plays (acres)		24.13
Biological Resources		
Designated Critical Habitat (acres)		0.00
Native Prairies (acres)		0.00
SGP CHAT -- Rank 1 (acres)		0.00
SGP CHAT -- Rank 2&3 (acres)		0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)		0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)		0.00
LPC Lek (acres)		0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)		0.00
Gray Bat Potential Occurrence Area (acres)		0.00
Indiana Bat Potential Occurrence Area (acres)		24.13
Whooping Crane Sitings (count 1 mile)		0
ABB Potential Occurrence Area (acres)		0.00
Water Resources		
NHD Flowlines (mileage withing ROW)		0.00
NWI Forested Wetlands (count)		0
NWI Non-Forested Wetlands (count)		0
NWI Forested Crossings >1,000 ft		0

Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft		0
NWI Forested Wetlands (acres)		0.00
NWI Non-Forested Wetlands (acres)		0.00
NLCD Forested Wetlands (count)		0
NLCD Non-Forested Wetlands (count)		0
NLCD Forested Crossings > 1,000 ft (count)		0
NLCD Non-Forested Crossings > 1,000 ft (count)		0
NLCD Forested Wetlands Acres		0.00
NLCD Non-Forested Wetlands Acres		0.00
Floodplains (acres)		4.84
Floodplains (count)		2
Floodplains - Crossings > 1,000 ft (count)		2
Major Waterbodies (count)		0
State-Designated Waterbodies (count)		0
Other Waterbodies (count)		0
Nutrient Vulnerable Groundwater (acres)		0.00
Wellhead Protection Areas (acres)		0.00
Groundwater Wells (count 1000 ft)		0
National Rivers Inventory (count)		0
Special Source Groundwater (acres)		0.00
Springs 0 - 250 ft (count)		0
Springs 250 - 500 ft (count)		0
Wild and Scenic Rivers (count)		0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)		0
NRHP Listed Sites (count 1000 ft)		0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)		0
GLO Sites (count 1000 ft)		0
Historical Sites (count 1000 ft)		0
Total Recorded Cultural or Historical Sites (count 1000 ft)		0
Cemeteries (count 1000 ft)		0
Cultural Resource Land Cover (acres)		
Class A		0.12
Class B		28.27
Class C		106.67
Class W		0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)		0
FAA Private Airports & Heliports (count 25,000 ft)		0
Private Airstrips (count 1 mile)		0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)		0

Environmental and
Infrastructure Data

Based on1000ft ROI

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Alternative Route Adjustment		FEIS AR 5E-adj
Overview		
Total Length (mi)		0.78
Total Acreage (ROI -1000 ft)		75.95
Parcels & Infrastructure Parallel		
Parcels Crossed (count)		9
Existing Transmission Parallel (mi)		0.00
Existing Transmission Crossings (count)		0
Road Parallel (mi)		0.05
All Road Crossings (count)		1
Interstate, US, & State Highway Crossings (count)		0
Pipeline Parallel (mi)		0.00
Pipeline Crossings (count)		0
Railroad Crossings (count)		0
Total Paralleling Existing Linear Infrastructure (mi)		0.05
NLCD 2011 Land Cover (acres)		
Pasture/Hay		15.73
Barren Land		0.00
Grassland Herbaceous		0.39
Shrub/Scrub		0.00
Cultivated Crops		0.00
Total Agricultural and Open Lands		16.12
Forested Areas		57.56
Urban/Developed Areas		2.26
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft		0
100-250 ft		0
250 - 500 ft		0
500 - 1000 ft		0
Churches		
0-100 ft		0
100-250 ft		0
250 - 500 ft		0
500 - 1000 ft		0
Hospitals		
0-100 ft		0
100-250 ft		0
250 - 500 ft		0
500 - 1000 ft		0
Residences		
0-100 ft		0
100-250 ft		1
250 - 500 ft		0
500 - 1000 ft		5
Agricultural, Commercial, Industrial		
0-100 ft		0
100-250 ft		0
250 - 500 ft		0

Structure Proximities (cont'd)		
500 - 1000 ft		1
Government Jurisdictions (acres)		
Cities & Towns		0.00
National Forest - Admin Boundary		0.00
National Forest - Federal-Owned		0.00
National Wildlife Refuges Aquistion Boundary (USFWS)		0.00
National Parks		0.00
USACE Lands		0.00
DOD Lands		0.00
State Parks		
Oklahoma State Parks		0.00
Arkansas State Parks		0.00
Tennessee State Parks		0.00
State-Owned WMA's		
Oklahoma WMA's		0.00
Tennessee WMA's		0.00
Arkansas Leased WMA's		
Oklahoma School Lands		0.00
Arkansas Natural Areas		0.00
Tennessee Natural Areas		0.00
County, Municipal Conservation Areas		0.00
Tribal Trust Lands and Allotments		0.00
Conservation Easements (acres)		
Federal Conservation Easements		0.00
State Conservation Easements		0.00
The Nature Conservancy Easments		0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)		5.08
Farmlands of Statewide Importance (acres)		0.00
Slopes Greater than 20% (acres)		4.01
Karst Areas (acres)		0.00
Landslide Incidence - High (acres)		0.00
Landslide Incidence - Moderate (acres)		0.00
Landslide Incidence - Low (acres)		0.00
Landslide Suceptibility - High (acres)		0.00
Landslide Suceptibility - Moderate (acres)		76.00
Mineral Plants - Count 1000 ft		0
Fault Lines - Total Crossed		0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9		0
Earthquake Epicenters - Count 1000 ft: Class > 4.0		0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)		0.00
Soil Limitations (acres)		
High Water Erosion Potential		0.00
High Wind Erosion Potential		4.40
Shallow Bedrock		1.95
Hydric Soils		0.00
Stony Soils		7.70
High Corrosion Potential		10.14
High Compaction Potential		0.00
Shale Plays (acres)		12.30
Biological Resources		
Designated Critical Habitat (acres)		0.00
Native Prairies (acres)		0.00
SGP CHAT -- Rank 1 (acres)		0.00
SGP CHAT -- Rank 2&3 (acres)		0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)		0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)		0.00
LPC Lek (acres)		0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)		0.00
Gray Bat Potential Occurrence Area (acres)		0.00
Indiana Bat Potential Occurrence Area (acres)		10.02
Whooping Crane Sitings (count 1 mile)		0
ABB Potential Occurrence Area (acres)		0.00
Water Resources		
NHD Flowlines (mileage withing ROW)		0.00
NWI Forested Wetlands (count)		0
NWI Non-Forested Wetlands (count)		0
NWI Forested Crossings >1,000 ft		0

Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft		0
NWI Forested Wetlands (acres)		0.00
NWI Non-Forested Wetlands (acres)		0.00
NLCD Forested Wetlands (count)		0
NLCD Non-Forested Wetlands (count)		0
NLCD Forested Crossings > 1,000 ft (count)		0
NLCD Non-Forested Crossings > 1,000 ft (count)		0
NLCD Forested Wetlands Acres		0.00
NLCD Non-Forested Wetlands Acres		0.00
Floodplains (acres)		0.31
Floodplains (count)		1
Floodplains - Crossings > 1,000 ft (count)		0
Major Waterbodies (count)		1
State-Designated Waterbodies (count)		0
Other Waterbodies (count)		0
Nutrient Vulnerable Groundwater (acres)		0.00
Wellhead Protection Areas (acres)		0.00
Groundwater Wells (count 1000 ft)		0
National Rivers Inventory (count)		1
Special Source Groundwater (acres)		0.00
Springs 0 - 250 ft (count)		0
Springs 250 - 500 ft (count)		0
Wild and Scenic Rivers (count)		0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)		0
NRHP Listed Sites (count 1000 ft)		0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)		0
GLO Sites (count 1000 ft)		0
Historical Sites (count 1000 ft)		0
Total Recorded Cultural or Historical Sites (count 1000 ft)		0
Cemeteries (count 1000 ft)		0
Cultural Resource Land Cover (acres)		
Class A		2.26
Class B		15.07
Class C		58.62
Class W		0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)		0
FAA Private Airports & Heliports (count 25,000 ft)		1
Private Airstrips (count 1 mile)		0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)		0

Environmental and
Infrastructure Data

Based on1000ft ROI

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Alternative Route Adjustment	FEIS AR 6A-adj
Overview	
Total Length (mi)	15.87
Total Acreage (ROI -1000 ft)	1908.45
Parcels & Infrastructure Parallel	
Parcels Crossed (count)	87
Existing Transmission Parallel (mi)	0.11
Existing Transmission Crossings (count)	0
Road Parallel (mi)	1.98
All Road Crossings (count)	11
Interstate, US, & State Highway Crossings (count)	3
Pipeline Parallel (mi)	0.00
Pipeline Crossings (count)	0
Railroad Crossings (count)	1
Total Paralleling Existing Linear Infrastructure (mi)	2.10
NLCD 2011 Land Cover (acres)	
Pasture/Hay	0.00
Barren Land	0.00
Grassland Herbaceous	0.00
Shrub/Scrub	0.00
Cultivated Crops	1573.97
Total Agricultural and Open Lands	1573.97
Forested Areas	0.46
Urban/Developed Areas	61.88
Structure Proximities (count)	
K-12 Schools. Colleges, and Universities	
0-100 ft	0
100-250 ft	0
250 - 500 ft	0
500 - 1000 ft	0
Churches	
0-100 ft	0
100-250 ft	0
250 - 500 ft	0
500 - 1000 ft	0
Hospitals	
0-100 ft	0
100-250 ft	0
250 - 500 ft	0
500 - 1000 ft	0
Residences	
0-100 ft	1
100-250 ft	1
250 - 500 ft	2
500 - 1000 ft	4
Agricultural, Commercial, Industrial	
0-100 ft	0
100-250 ft	0
250 - 500 ft	1

Structure Proximities (cont'd)		
500 - 1000 ft		3
Government Jurisdictions (acres)		
Cities & Towns		0.00
National Forest - Admin Boundary		0.00
National Forest - Federal-Owned		0.00
National Wildlife Refuges Aquistion Boundary (USFWS)		1.00
National Parks		0.00
USACE Lands		0.00
DOD Lands		0.00
State Parks		
Oklahoma State Parks		0.00
Arkansas State Parks		0.00
Tennessee State Parks		0.00
State-Owned WMA's		
Oklahoma WMA's		0.00
Tennessee WMA's		0.00
Arkansas Leased WMA's		
Oklahoma School Lands		0.00
Arkansas Natural Areas		0.00
Tennessee Natural Areas		0.00
County, Municipal Conservation Areas		0.00
Tribal Trust Lands and Allotments		0.00
Conservation Easements (acres)		
Federal Conservation Easements		0.00
State Conservation Easements		0.00
The Nature Conservancy Easments		0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)		508.68
Farmlands of Statewide Importance (acres)		131.97
Slopes Greater than 20% (acres)		0.00
Karst Areas (acres)		0.00
Landslide Incidence - High (acres)		0.00
Landslide Incidence - Moderate (acres)		0.00
Landslide Incidence - Low (acres)		1908.05
Landslide Suceptibility - High (acres)		0.00
Landslide Suceptibility - Moderate (acres)		0.00
Mineral Plants - Count 1000 ft		0
Fault Lines - Total Crossed		0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9		0
Earthquake Epicenters - Count 1000 ft: Class > 4.0		0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)		1784.47
Soil Limitations (acres)		
High Water Erosion Potential		290.53
High Wind Erosion Potential		87.61
Shallow Bedrock		231.51
Hydric Soils		147.16
Stony Soils		0.00
High Corrosion Potential		364.00
High Compaction Potential		368.83
Shale Plays (acres)		0.00
Biological Resources		
Designated Critical Habitat (acres)		0.00
Native Prairies (acres)		0.00
SGP CHAT -- Rank 1 (acres)		0.00
SGP CHAT -- Rank 2&3 (acres)		0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)		0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)		0.00
LPC Lek (acres)		0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)		0.00
Gray Bat Potential Occurrence Area (acres)		0.00
Indiana Bat Potential Occurrence Area (acres)		236.03
Whooping Crane Sitings (count 1 mile)		0
ABB Potential Occurrence Area (acres)		0.00
Water Resources		
NHD Flowlines (mileage withing ROW)		0.00
NWI Forested Wetlands (count)		12
NWI Non-Forested Wetlands (count)		1
NWI Forested Crossings >1,000 ft		6

Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft		0
NWI Forested Wetlands (acres)		21.23
NWI Non-Forested Wetlands (acres)		0.19
NLCD Forested Wetlands (count)		7
NLCD Non-Forested Wetlands (count)		0
NLCD Forested Crossings > 1,000 ft (count)		6
NLCD Non-Forested Crossings > 1,000 ft (count)		0
NLCD Forested Wetlands Acres		25.12
NLCD Non-Forested Wetlands Acres		0.00
Floodplains (acres)		129.37
Floodplains (count)		1
Floodplains - Crossings > 1,000 ft (count)		1
Major Waterbodies (count)		1
State-Designated Waterbodies (count)		0
Other Waterbodies (count)		5
Nutrient Vulnerable Groundwater (acres)		0.00
Wellhead Protection Areas (acres)		0.00
Groundwater Wells (count 1000 ft)		7
National Rivers Inventory (count)		0
Special Source Groundwater (acres)		0.00
Springs 0 - 250 ft (count)		0
Springs 250 - 500 ft (count)		0
Wild and Scenic Rivers (count)		0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)		0
NRHP Listed Sites (count 1000 ft)		0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)		0
GLO Sites (count 1000 ft)		0
Historical Sites (count 1000 ft)		0
Total Recorded Cultural or Historical Sites (count 1000 ft)		0
Cemeteries (count 1000 ft)		1
Cultural Resource Land Cover (acres)		
Class A		1640.83
Class B		0.00
Class C		164.91
Class W		102.70
Aviation Facilities		
FAA Public Airports (count 25,000 ft)		0
FAA Private Airports & Heliports (count 25,000 ft)		0
Private Airstrips (count 1 mile)		1
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)		0

Exhibit 3, 200-Foot-Wide Route Variation Comparison Tables

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Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Comparison Name*	Region 2 Link 1 APR	Region 2 Link 1 Var 1
Overview		
Total Length (mi)	2.30	2.37
Total Acreage (ROW - 200 ft)	55.14	56.62
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	7	6
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	1	1
Road Parallel (mi)	0.47	0.44
All Road Crossings (count)	2	2
Interstate, US, & State Highway Crossings (count)	1	1
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	2
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.47	0.44
NLCD 2011 Land Cover (acres)		
Pasture/Hay	0.00	0.00
Barren Land	0.00	0.00
Grassland Herbaceous	46.61	51.91
Shrub/Scrub	0.00	0.00
Cultivated Crops	0.00	0.00
Total Agricultural and Open Lands	46.61	51.91
Forested Areas	5.23	1.08
Urban/Developed Areas	3.05	2.89
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	3
500 - 1000 ft	2	3
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	2

* For purposes of comparing the original APR with each route variation, only that portion of the original APR link is captured in the first column of this exhibit (Exhibit 3).

	Region 2 Link 1 APR	Region 2 Link 1 Var 1
Structure Proximities (cont'd)		
500 - 1000 ft	0	0
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	1.77	5.95
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.00	0.00
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	55.12	56.61
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	0.00	0.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	0.00	0.00
High Wind Erosion Potential	51.97	56.62
Shallow Bedrock	0.00	0.00
Hydric Soils	0.00	0.00
Stony Soils	0.00	0.00
High Corrosion Potential	3.17	0.00
High Compaction Potential	4.96	2.00
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	24.08	23.83
SGP CHAT -- Rank 1 (acres)	10.57	52.06
SGP CHAT -- Rank 2&3 (acres)	44.57	4.56
SGP CHAT -- Rank 1 -- Existing Impact (acres)	6.12	28.26
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	32.62	32.69
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	0.00	0.00
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.00	0.00
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 2 Link 1 APR	Region 2 Link 1 Var 1
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00

NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.00
Floodplains (count)	0	0
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	55.14	56.62
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	2	2
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	3.68	2.76
Class B	46.36	53.00
Class C	5.09	0.86
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	1
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Comparison Name	Region 2 Link 2 APR	Region 2 Link 2 Var 2
Overview		
Total Length (mi)	9.68	9.70
Total Acreage (ROW - 200 ft)	234.06	234.45
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	30	27
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	1	1
Road Parallel (mi)	1.25	1.91
All Road Crossings (count)	10	10
Interstate, US, & State Highway Crossings (count)	1	1
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	1	1
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	1.25	1.91
NLCD 2011 Land Cover (acres)		
Pasture/Hay	0.00	0.00
Barren Land	0.00	0.00
Grassland Herbaceous	37.44	67.58
Shrub/Scrub	0.00	0.00
Cultivated Crops	184.73	160.23
Total Agricultural and Open Lands	222.18	227.81
Forested Areas	0.00	0.16
Urban/Developed Areas	10.28	5.05
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	1
100-250 ft	0	0
250 - 500 ft	3	5
500 - 1000 ft	7	5
Agricultural, Commercial, Industrial		
0-100 ft	1	0
100-250 ft	1	2
250 - 500 ft	8	3

	Region 2 Link 2 APR	Region 2 Link 2 Var 2
Structure Proximities (cont'd)		
500 - 1000 ft	20	3
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	128.05	131.75
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.00	0.00
Karst Areas (acres)	26.36	30.09
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	234.01	234.40
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	0.00	0.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	52.01	40.34
High Wind Erosion Potential	112.34	118.86
Shallow Bedrock	5.48	11.07
Hydric Soils	0.00	0.00
Stony Soils	0.00	0.00
High Corrosion Potential	62.41	57.12
High Compaction Potential	142.67	150.14
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	0.00	0.00
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.00	0.00
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	1	1
NWI Forested Crossings >1,000 ft	0	0

	Region 2 Link 2 APR	Region 2 Link 2 Var 2
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	1
NWI Forested Wetlands (acres)	0.00	0.00

NWI Non-Forested Wetlands (acres)	0.41	1.33
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.00
Floodplains (count)	0	0
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	11.24	10.48
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	4	5
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	1	1
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	196.88	166.39
Class B	37.18	67.66
Class C	0.00	0.41
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Comparison Name	Region 3 Link 1 APR	Region 3 Link 1 Var 2
Overview		
Total Length (mi)	3.30	3.71
Total Acreage (ROW- 200 ft)	79.23	89.25
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	8	12
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.51	0.00
All Road Crossings (count)	4	3
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	1	1
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.51	0.00
NLCD 2011 Land Cover (acres)		
Pasture/Hay	0.00	0.00
Barren Land	0.00	0.00
Grassland Herbaceous	56.38	61.83
Shrub/Scrub	0.00	0.00
Cultivated Crops	6.35	0.48
Total Agricultural and Open Lands	62.73	62.31
Forested Areas	13.01	24.25
Urban/Developed Areas	2.28	1.32
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	1	0
250 - 500 ft	0	1
500 - 1000 ft	2	3
Agricultural, Commercial, Industrial		
0-100 ft	1	0
100-250 ft	1	1
250 - 500 ft	3	3

	Region 3 Link 1 APR	Region 3 Link 1 Var 2
Structure Proximities (cont'd)		
500 - 1000 ft	5	2
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	32.53	41.12
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.20	0.05
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	79.21	89.23
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	0.00	0.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	41.74	17.44
High Wind Erosion Potential	29.64	37.40
Shallow Bedrock	16.75	7.47
Hydric Soils	0.00	0.00
Stony Soils	0.00	0.00
High Corrosion Potential	56.97	41.10
High Compaction Potential	73.03	75.28
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	23.64	42.89
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	0.00	0.00
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.22	0.16
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 3 Link 1 APR	Region 3 Link 1 Var 2
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00

NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.00
Floodplains (count)	0	0
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	1	2
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	0
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	8.39	2.40
Class B	56.24	61.99
Class C	13.44	23.63
Class W	1.17	1.23
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Comparison Name	Region 3 Links 1 and 2 APR	Region 3 Links 1 and 2 Var 1
Overview		
Total Length (mi)	2.80	2.83
Total Acreage (ROW - 200 ft)	67.27	67.89
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	25	13
Existing Transmission Parallel (mi)	1.48	0.08
Existing Transmission Crossings (count)	2	0
Road Parallel (mi)	0.14	0.07
All Road Crossings (count)	3	3
Interstate, US, & State Highway Crossings (count)	1	1
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	2	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	1.63	0.15
NLCD 2011 Land Cover (acres)		
Pasture/Hay	14.90	3.20
Barren Land	0.00	0.00
Grassland Herbaceous	36.50	57.48
Shrub/Scrub	0.00	0.00
Cultivated Crops	5.54	0.00
Total Agricultural and Open Lands	56.94	60.68
Forested Areas	7.08	2.83
Urban/Developed Areas	2.53	2.12
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	1	0
100-250 ft	1	7
250 - 500 ft	6	11
500 - 1000 ft	26	8
Agricultural, Commercial, Industrial		
0-100 ft	1	0
100-250 ft	3	4
250 - 500 ft	7	1

	Region 3 Links 1 and 2 APR	Region 3 Links 1 and 2 Var 1
Structure Proximities (cont'd)		
500 - 1000 ft	13	11
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	24.40	39.69
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.00	0.00
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	67.26	67.88
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	0.00	0.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	31.55	25.24
High Wind Erosion Potential	20.84	10.43
Shallow Bedrock	9.97	1.88
Hydric Soils	0.00	0.00
Stony Soils	0.00	0.00
High Corrosion Potential	37.94	34.21
High Compaction Potential	54.29	59.32
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	0.00	0.00
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.47	0.23
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 3 Links 1 and 2 APR	Region 3 Links 1 and 2 Var 1
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00

NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.57	0.04
Floodplains (count)	2	1
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	3	0
Nutrient Vulnerable Groundwater (acres)	23.31	39.73
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	2	3
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	8.42	3.09
Class B	51.65	60.49
Class C	6.53	2.96
Class W	0.68	1.34
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	1	1
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Comparison Name	Region 3 Link 4 APR	Region 3 Link 4 Var 1
Overview		
Total Length (mi)	0.92	1.00
Total Acreage (ROW - 200 ft)	21.46	23.46
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	4	4
Existing Transmission Parallel (mi)	0.00	0.42
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.05	0.13
All Road Crossings (count)	0	0
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.05	0.56
NLCD 2011 Land Cover (acres)		
Pasture/Hay	0.00	0.00
Barren Land	0.00	0.00
Grassland Herbaceous	18.67	21.71
Shrub/Scrub	0.00	0.00
Cultivated Crops	0.00	0.00
Total Agricultural and Open Lands	18.67	21.71
Forested Areas	0.00	1.35
Urban/Developed Areas	0.37	0.39
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	1	1
500 - 1000 ft	4	7
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	3	4

	Region 3 Link 4 APR	Region 3 Link 4 Var 1
Structure Proximities (cont'd)		
500 - 1000 ft	4	5
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	3.97	2.82
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.00	0.00
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	21.46	23.45
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	0.00	0.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	6.42	4.39
High Wind Erosion Potential	0.00	0.00
Shallow Bedrock	0.00	0.00
Hydric Soils	0.00	0.00
Stony Soils	0.00	0.00
High Corrosion Potential	12.69	11.11
High Compaction Potential	21.46	23.28
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	0.00	0.00
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.01	0.02
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 3 Link 4 APR	Region 3 Link 4 Var 1
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00

NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.00
Floodplains (count)	0	0
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	2
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	0
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	0.27	0.27
Class B	19.11	21.95
Class C	0.00	1.24
Class W	2.09	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	1	1
FAA Private Airports & Heliports (count 25,000 ft)	3	3
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Comparison Name	Region 3 Link 4 APR	Region 3 Link 4 Var 2
Overview		
Total Length (mi)	1.23	1.28
Total Acreage (ROW - 200 ft)	29.14	30.42
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	5	5
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.66	0.77
All Road Crossings (count)	2	3
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	1	1
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.66	0.77
NLCD 2011 Land Cover (acres)		
Pasture/Hay	1.84	0.33
Barren Land	0.00	0.00
Grassland Herbaceous	22.18	21.64
Shrub/Scrub	0.00	0.00
Cultivated Crops	0.00	0.00
Total Agricultural and Open Lands	24.02	21.97
Forested Areas	3.65	7.32
Urban/Developed Areas	1.47	1.12
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	1	1
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0

	Region 3 Link 4 APR	Region 3 Link 4 Var 2
Structure Proximities (cont'd)		
500 - 1000 ft	2	2
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	23.26	22.83
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.00	0.00
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	29.13	30.42
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	0.00	0.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	16.86	11.53
High Wind Erosion Potential	6.71	11.31
Shallow Bedrock	8.00	7.84
Hydric Soils	0.00	0.00
Stony Soils	5.29	4.30
High Corrosion Potential	16.82	11.52
High Compaction Potential	22.43	16.03
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	14.57	15.21
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	0.00	0.00
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.00	0.00
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 3 Link 4 APR	Region 3 Link 4 Var 2
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00

NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.00
Floodplains (count)	0	0
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	3	2
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	1.58	1.00
Class B	23.88	21.99
Class C	3.68	7.43
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Comparison Name	Region 3 Link 5 APR	Region 3 Link 5 Var 2
Overview		
Total Length (mi)	2.50	2.42
Total Acreage (ROW - 200 ft)	60.02	58.02
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	11	7
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	2	2
Road Parallel (mi)	0.19	0.40
All Road Crossings (count)	2	2
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.19	0.40
NLCD 2011 Land Cover (acres)		
Pasture/Hay	35.91	27.17
Barren Land	0.00	0.00
Grassland Herbaceous	15.47	13.39
Shrub/Scrub	0.00	0.00
Cultivated Crops	0.00	0.00
Total Agricultural and Open Lands	51.39	40.56
Forested Areas	7.67	16.52
Urban/Developed Areas	0.95	0.93
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	1	1
100-250 ft	0	1
250 - 500 ft	0	4
500 - 1000 ft	8	7
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	1	0
250 - 500 ft	0	1

	Region 3 Link 5 APR	Region 3 Link 5 Var 2
Structure Proximities (cont'd)		
500 - 1000 ft	3	3
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	51.52	51.94
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.00	0.00
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	60.01	58.01
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	0.00	0.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	9.38	12.92
High Wind Erosion Potential	10.10	4.17
Shallow Bedrock	1.35	0.00
Hydric Soils	0.00	0.00
Stony Soils	0.00	0.00
High Corrosion Potential	12.78	17.53
High Compaction Potential	60.02	57.76
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	0.00	0.00
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.07	0.12
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 3 Link 5 APR	Region 3 Link 5 Var 2
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00

NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.00
Floodplains (count)	0	0
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	1
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	1
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	1	1
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	0.95	0.97
Class B	50.80	39.97
Class C	8.27	17.09
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	1	1
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

Comparison Name	Region 4 Link 3 APR	Region 4 Link 3 Var 1
Overview		
Total Length (mi)	2.03	2.04
Total Acreage (ROW - 200 ft)	48.58	48.78
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	15	17
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.20	0.17
All Road Crossings (count)	2	2
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.20	0.17
NLCD 2011 Land Cover (acres)		
Pasture/Hay	41.60	40.16
Barren Land	0.00	0.00
Grassland Herbaceous	0.00	0.00
Shrub/Scrub	0.64	1.81
Cultivated Crops	0.00	0.00
Total Agricultural and Open Lands	42.24	41.96
Forested Areas	4.47	5.88
Urban/Developed Areas	0.91	0.93
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	0	1
250 - 500 ft	5	3
500 - 1000 ft	8	6
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	1

	Region 4 Link 3 APR	Region 4 Link 3 Var 1
Structure Proximities (cont'd)		
500 - 1000 ft	7	6
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	19.71	26.44
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.00	0.00
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	49.00	49.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	15.58	22.77
High Wind Erosion Potential	5.60	5.14
Shallow Bedrock	10.53	10.86
Hydric Soils	0.00	0.00
Stony Soils	3.96	6.17
High Corrosion Potential	39.03	37.50
High Compaction Potential	44.62	42.60
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	48.58	48.78
Gray Bat Potential Occurrence Area (acres)	48.58	48.78
Indiana Bat Potential Occurrence Area (acres)	0.00	0.00
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.12	0.15
NWI Forested Wetlands (count)	1	2
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	1	1

	Region 4 Link 3 APR	Region 4 Link 3 Var 1
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	2.05	1.67

NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	1	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.87	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	3.59	3.34
Floodplains (count)	1	1
Floodplains - Crossings > 1,000 ft (count)	1	1
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	0
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	1	1
Cultural Resource Land Cover (acres)		
Class A	1.13	1.08
Class B	41.72	42.59
Class C	5.73	5.11
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Comparison Name	Region 4 Link 3 APR	Region 4 Link 3 Var 2
Overview		
Total Length (mi)	7.01	7.02
Total Acreage (ROW - 200 ft)	169.21	169.42
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	25	17
Existing Transmission Parallel (mi)	1.55	4.16
Existing Transmission Crossings (count)	1	1
Road Parallel (mi)	0.30	0.26
All Road Crossings (count)	5	5
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	1.85	4.42
NLCD 2011 Land Cover (acres)		
Pasture/Hay	117.45	80.45
Barren Land	0.00	0.00
Grassland Herbaceous	8.22	7.36
Shrub/Scrub	1.43	4.58
Cultivated Crops	0.00	0.14
Total Agricultural and Open Lands	127.09	92.53
Forested Areas	39.53	74.01
Urban/Developed Areas	2.54	2.84
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	1	0
250 - 500 ft	8	1
500 - 1000 ft	6	9
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	3	1

	Region 4 Link 3 APR	Region 4 Link 3 Var 2
Structure Proximities (cont'd)		
500 - 1000 ft	4	3
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	1.00	1.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	47.19	53.61
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.45	1.05
Karst Areas (acres)	54.36	101.15
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	169.00	170.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	49.55	47.67
High Wind Erosion Potential	0.00	0.00
Shallow Bedrock	85.16	88.58
Hydric Soils	0.00	0.00
Stony Soils	83.29	88.12
High Corrosion Potential	73.81	63.07
High Compaction Potential	130.75	80.80
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	169.21	169.42
Gray Bat Potential Occurrence Area (acres)	169.21	169.42
Indiana Bat Potential Occurrence Area (acres)	0.00	0.00
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.46	0.33
NWI Forested Wetlands (count)	2	0
NWI Non-Forested Wetlands (count)	1	0
NWI Forested Crossings >1,000 ft	1	0

	Region 4 Link 3 APR	Region 4 Link 3 Var 2
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	1	0
NWI Forested Wetlands (acres)	1.52	0.00

NWI Non-Forested Wetlands (acres)	0.84	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	25.98	15.21
Floodplains (count)	5	4
Floodplains - Crossings > 1,000 ft (count)	4	2
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	1	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	0
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	1	1
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	2.68	3.26
Class B	128.45	92.94
Class C	38.07	73.21
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	2	1
Private Airstrips (count 1 mile)	2	1
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

Comparison Name	Region 4 Link 3 APR	Region 4 Link 3 Var 3
Overview		
Total Length (mi)	3.54	3.25
Total Acreage (ROW - 200 ft)	85.13	78.18
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	22	10
Existing Transmission Parallel (mi)	0.83	0.02
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.88	0.55
All Road Crossings (count)	2	2
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	1.71	0.57
NLCD 2011 Land Cover (acres)		
Pasture/Hay	2.41	15.65
Barren Land	0.00	0.00
Grassland Herbaceous	2.81	0.00
Shrub/Scrub	0.06	0.00
Cultivated Crops	0.00	0.00
Total Agricultural and Open Lands	5.28	15.65
Forested Areas	79.18	59.95
Urban/Developed Areas	0.65	2.07
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	1	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	0	2
250 - 500 ft	3	10
500 - 1000 ft	11	26
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	2
250 - 500 ft	2	6

	Region 4 Link 3 APR	Region 4 Link 3 Var 3
Structure Proximities (cont'd)		
500 - 1000 ft	11	12
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	1.17	2.40
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	8.31	4.49
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	85.00	78.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	0.00	0.00
High Wind Erosion Potential	2.77	11.71
Shallow Bedrock	2.71	16.09
Hydric Soils	0.00	0.00
Stony Soils	81.97	53.74
High Corrosion Potential	84.02	71.40
High Compaction Potential	0.00	11.83
Shale Plays (acres)	3.34	2.14
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	85.13	78.18
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	85.13	78.18
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.26	0.24
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 4 Link 3 APR	Region 4 Link 3 Var 3
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00

NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.00
Floodplains (count)	0	0
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	0
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	0.59	3.28
Class B	7.80	15.12
Class C	76.73	59.78
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Comparison Name	Region 4 Link 6 APR	Region 4 Link 6 Var 1
Overview		
Total Length (mi)	1.05	1.08
Total Acreage (ROW - 200 ft)	24.69	25.37
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	8	8
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.12	0.12
All Road Crossings (count)	1	1
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.12	0.12
NLCD 2011 Land Cover (acres)		
Pasture/Hay	12.38	11.29
Barren Land	0.00	0.00
Grassland Herbaceous	0.00	0.00
Shrub/Scrub	0.00	0.00
Cultivated Crops	0.00	0.00
Total Agricultural and Open Lands	12.38	11.29
Forested Areas	11.84	13.63
Urban/Developed Areas	0.46	0.45
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	1	0
250 - 500 ft	1	1
500 - 1000 ft	11	9
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	1	0

	Region 4 Link 6 APR	Region 4 Link 6 Var 1
Structure Proximities (cont'd)		
500 - 1000 ft	0	1
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	11.62	10.53
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.35	0.29
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	25.00	26.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	0.00	0.00
High Wind Erosion Potential	11.64	10.53
Shallow Bedrock	0.01	0.00
Hydric Soils	0.00	0.00
Stony Soils	13.05	14.87
High Corrosion Potential	24.69	25.37
High Compaction Potential	0.00	0.00
Shale Plays (acres)	24.69	25.37
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	24.69	25.37
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	24.69	25.37
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.03	0.04
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 4 Link 6 APR	Region 4 Link 6 Var 1
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00

NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.00
Floodplains (count)	0	0
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	0
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	0.46	0.45
Class B	12.25	11.45
Class C	11.98	13.47
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	1	1
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Comparison Name	Region 4 Link 6 APR	Region 4 Link 6 Var 2
Overview		
Total Length (mi)	2.43	2.46
Total Acreage (ROW - 200 ft)	58.22	58.88
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	17	18
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.59	0.69
All Road Crossings (count)	4	4
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.59	0.69
NLCD 2011 Land Cover (acres)		
Pasture/Hay	32.89	36.87
Barren Land	0.00	0.00
Grassland Herbaceous	0.00	0.00
Shrub/Scrub	0.00	0.00
Cultivated Crops	19.34	15.73
Total Agricultural and Open Lands	52.23	52.59
Forested Areas	3.09	3.05
Urban/Developed Areas	1.81	1.64
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	1
500 - 1000 ft	4	3
Agricultural, Commercial, Industrial		
0-100 ft	0	1
100-250 ft	1	0
250 - 500 ft	1	1

	Region 4 Link 6 APR	Region 4 Link 6 Var 2
Structure Proximities (cont'd)		
500 - 1000 ft	2	3
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	5.78	1.43
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	25.95	22.18
Farmlands of Statewide Importance (acres)	16.32	18.14
Slopes Greater than 20% (acres)	0.00	0.00
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	58.21	58.87
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	0.00	0.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	32.23	36.67
High Wind Erosion Potential	25.96	22.19
Shallow Bedrock	0.00	0.00
Hydric Soils	41.89	40.73
Stony Soils	0.00	0.00
High Corrosion Potential	58.22	58.88
High Compaction Potential	58.22	58.88
Shale Plays (acres)	58.22	58.88
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	58.22	58.88
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	58.22	58.88
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.38	0.33
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 4 Link 6 APR	Region 4 Link 6 Var 2
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00

NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	41.98	34.02
Floodplains (count)	2	2
Floodplains - Crossings > 1,000 ft (count)	2	2
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	0
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	23.06	20.61
Class B	31.94	35.21
Class C	3.22	3.06
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Comparison Name	Region 4 Link 6 APR	Region 4 Link 6 Var 3
Overview		
Total Length (mi)	1.90	1.81
Total Acreage (ROW - 200 ft)	45.27	43.05
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	18	16
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.18	0.41
All Road Crossings (count)	4	3
Interstate, US, & State Highway Crossings (count)	1	1
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.18	0.41
NLCD 2011 Land Cover (acres)		
Pasture/Hay	9.74	6.53
Barren Land	0.00	0.00
Grassland Herbaceous	0.14	0.56
Shrub/Scrub	0.00	0.00
Cultivated Crops	0.00	0.00
Total Agricultural and Open Lands	9.88	7.09
Forested Areas	32.07	33.28
Urban/Developed Areas	3.31	2.67
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	1	0
100-250 ft	2	2
250 - 500 ft	5	5
500 - 1000 ft	12	14
Agricultural, Commercial, Industrial		
0-100 ft	0	1
100-250 ft	0	0
250 - 500 ft	3	1

	Region 4 Link 6 APR	Region 4 Link 6 Var 3
Structure Proximities (cont'd)		
500 - 1000 ft	3	4
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	5.24	4.46
Farmlands of Statewide Importance (acres)	1.15	3.67
Slopes Greater than 20% (acres)	3.90	1.04
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	45.00	43.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	1.19	3.74
High Wind Erosion Potential	5.24	4.47
Shallow Bedrock	0.00	0.00
Hydric Soils	0.00	0.00
Stony Soils	29.31	21.99
High Corrosion Potential	44.12	39.38
High Compaction Potential	10.74	16.57
Shale Plays (acres)	45.27	43.05
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	45.27	43.05
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	45.27	43.05
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.04	0.04
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 4 Link 6 APR	Region 4 Link 6 Var 3
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00

NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.00
Floodplains (count)	0	0
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	2	1
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	0
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	3.97	2.43
Class B	10.46	7.03
Class C	30.85	33.58
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Comparison Name	Region 4 Link 9 APR	Region 4 Link 9 Var 1
Overview		
Total Length (mi)	3.12	3.12
Total Acreage (ROW - 200 ft)	74.81	74.93
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	18	20
Existing Transmission Parallel (mi)	2.57	2.83
Existing Transmission Crossings (count)	2	0
Road Parallel (mi)	0.77	0.37
All Road Crossings (count)	2	2
Interstate, US, & State Highway Crossings (count)	1	1
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	1	1
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	3.33	3.20
NLCD 2011 Land Cover (acres)		
Pasture/Hay	44.99	48.15
Barren Land	0.00	0.00
Grassland Herbaceous	1.55	2.76
Shrub/Scrub	0.00	0.00
Cultivated Crops	0.00	0.00
Total Agricultural and Open Lands	46.55	50.91
Forested Areas	25.31	20.70
Urban/Developed Areas	2.36	2.04
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	1	1
500 - 1000 ft	11	8
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	1	1

	Region 4 Link 9 APR	Region 4 Link 9 Var 1
Structure Proximities (cont'd)		
500 - 1000 ft	7	7
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	100.62	95.64
Farmlands of Statewide Importance (acres)	22.13	25.95
Slopes Greater than 20% (acres)	1.62	1.16
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	75.00	75.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	1	1
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	18.35	16.37
High Wind Erosion Potential	49.10	51.42
Shallow Bedrock	10.07	9.31
Hydric Soils	0.00	0.00
Stony Soils	4.00	2.31
High Corrosion Potential	57.15	60.36
High Compaction Potential	59.05	52.72
Shale Plays (acres)	74.81	74.93
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	74.81	74.93
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.55	0.36
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 4 Link 9 APR	Region 4 Link 9 Var 1
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00

NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	43.50	40.93
Floodplains (count)	1	1
Floodplains - Crossings > 1,000 ft (count)	1	1
Major Waterbodies (count)	1	1
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	1	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	1	0
National Rivers Inventory (count)	1	1
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	1	1
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	1
Cultural Resource Land Cover (acres)		
Class A	2.71	2.90
Class B	48.38	50.30
Class C	23.72	21.47
Class W	0.00	0.26
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

Comparison Name	Region 5 Link 1 APR	Region 5 Link 1 Var 2
Overview		
Total Length (mi)	2.01	2.15
Total Acreage (ROW - 200 ft)	48.06	51.35
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	17	13
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.07	0.04
All Road Crossings (count)	0	1
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.07	0.04
NLCD 2011 Land Cover (acres)		
Pasture/Hay	3.05	8.02
Barren Land	0.00	0.00
Grassland Herbaceous	3.42	0.00
Shrub/Scrub	0.80	0.00
Cultivated Crops	0.00	0.00
Total Agricultural and Open Lands	7.27	8.02
Forested Areas	40.68	42.27
Urban/Developed Areas	0.10	0.10
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	2	0
250 - 500 ft	5	3
500 - 1000 ft	10	10
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	2

	Region 5 Link 1 APR	Region 5 Link 1 Var 2
Structure Proximities (cont'd)		
500 - 1000 ft	9	11
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	54.11	23.91
Farmlands of Statewide Importance (acres)	0.00	3.83
Slopes Greater than 20% (acres)	2.88	2.38
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	48.00	51.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	0.00	1.91
High Wind Erosion Potential	36.74	33.13
Shallow Bedrock	15.59	32.33
Hydric Soils	0.00	0.00
Stony Soils	10.64	15.69
High Corrosion Potential	41.53	37.68
High Compaction Potential	13.62	5.82
Shale Plays (acres)	48.06	51.35
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	48.06	51.35
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.08	0.12
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 5 Link 1 APR	Region 5 Link 1 Var 2
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00

NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	2
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.50
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	14.89	5.97
Floodplains (count)	1	1
Floodplains - Crossings > 1,000 ft (count)	1	1
Major Waterbodies (count)	1	1
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	1	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	1
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	1	1
Cultural Resource Land Cover (acres)		
Class A	0.01	0.01
Class B	6.90	7.39
Class C	41.15	43.46
Class W	0.00	0.50
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	1	1
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Comparison Name	Region 5 Link 2 APR	Region 5 Link 2 Var 2
Overview		
Total Length (mi)	2.51	2.72
Total Acreage (ROW - 200 ft)	60.22	65.37
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	12	14
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.07	0.14
All Road Crossings (count)	2	0
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.07	0.14
NLCD 2011 Land Cover (acres)		
Pasture/Hay	5.68	6.27
Barren Land	0.00	0.00
Grassland Herbaceous	0.00	0.15
Shrub/Scrub	0.00	1.11
Cultivated Crops	0.00	0.00
Total Agricultural and Open Lands	5.68	7.54
Forested Areas	54.09	57.82
Urban/Developed Areas	0.43	0.00
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	0	1
250 - 500 ft	2	0
500 - 1000 ft	2	1
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	1	0

	Region 5 Link 2 APR	Region 5 Link 2 Variation 2
Structure Proximities (cont'd)		
500 - 1000 ft	0	0
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	0.99	0.00
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	9.17	8.95
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	60.00	66.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	0.00	0.00
High Wind Erosion Potential	24.11	25.87
Shallow Bedrock	43.15	60.13
Hydric Soils	0.00	0.00
Stony Soils	25.80	38.62
High Corrosion Potential	32.20	30.18
High Compaction Potential	0.00	0.00
Shale Plays (acres)	60.22	65.37
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	60.22	65.37
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.05	0.39
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	IRegion 5 Link 2 APR	IRegion 5 Link 2 Variation 2
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00
NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.00
Floodplains (count)	0	0
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	0
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	0.39	0.00
Class B	7.74	6.96
Class C	52.08	58.41
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Comparison Name	Region 5 Links 2 and 3 APR	Region 5 Links 2 and 3 Var 1
Overview		
Total Length (mi)	2.00	2.11
Total Acreage (ROW - 200 ft)	47.80	50.51
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	9	8
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.18	0.12
All Road Crossings (count)	2	2
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.18	0.12
NLCD 2011 Land Cover (acres)		
Pasture/Hay	0.84	2.71
Barren Land	0.00	0.00
Grassland Herbaceous	0.10	2.06
Shrub/Scrub	0.00	0.00
Cultivated Crops	0.00	0.00
Total Agricultural and Open Lands	0.94	4.77
Forested Areas	45.98	44.73
Urban/Developed Areas	0.87	1.00
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	1	0
250 - 500 ft	1	2
500 - 1000 ft	7	2
Agricultural, Commercial, Industrial		
0-100 ft	1	0
100-250 ft	0	0
250 - 500 ft	0	0

	Region 5 Links 2 and 3 APR	Region 5 Links 2 and 3 Var 1
Structure Proximities (cont'd)		
500 - 1000 ft	4	1
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	41.09	48.41
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	2.87	4.38
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	48.00	51.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	0.00	0.00
High Wind Erosion Potential	23.72	25.90
Shallow Bedrock	22.45	22.72
Hydric Soils	0.00	0.00
Stony Soils	19.76	20.74
High Corrosion Potential	28.52	29.49
High Compaction Potential	10.24	11.33
Shale Plays (acres)	47.80	50.51
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	47.80	50.51
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.32	0.13
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 5 Links 2 and 3 APR	Region 5 Links 2 and 3 Var 1
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00

NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	10.49	9.57
Floodplains (count)	1	1
Floodplains - Crossings > 1,000 ft (count)	1	1
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	1	0
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	0.82	0.99
Class B	1.20	5.06
Class C	45.77	44.46
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Comparison Name	Region 5 Links 3 & 4 APR	Region 5 Links 3 & 4 Var 2
Overview		
Total Length (mi)	4.28	4.22
Total Acreage (ROW - 200 ft)	102.93	101.63
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	18	13
Existing Transmission Parallel (mi)	0.07	0.00
Existing Transmission Crossings (count)	1	1
Road Parallel (mi)	0.15	0.70
All Road Crossings (count)	3	4
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	2	1
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.22	0.70
NLCD 2011 Land Cover (acres)		
Pasture/Hay	15.53	23.46
Barren Land	0.00	0.00
Grassland Herbaceous	9.61	10.35
Shrub/Scrub	1.04	0.00
Cultivated Crops	3.05	0.00
Total Agricultural and Open Lands	29.24	33.81
Forested Areas	72.36	64.95
Urban/Developed Areas	1.31	2.04
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	0	1
250 - 500 ft	0	3
500 - 1000 ft	3	5
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	2

	Region 5 Links 3 & 4 APR	Region 5 Links 3 & 4 Var 2
Structure Proximities (cont'd)		
500 - 1000 ft	5	3
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	1.91	4.66
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	2.64	1.68
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	103.00	102.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	0.00	0.00
High Wind Erosion Potential	35.70	59.63
Shallow Bedrock	0.00	0.00
Hydric Soils	0.00	0.00
Stony Soils	56.79	40.01
High Corrosion Potential	92.56	99.65
High Compaction Potential	9.84	1.98
Shale Plays (acres)	102.93	101.63
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	102.93	101.63
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.48	0.39
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 5 Links 3 & 4 APR	Region 5 Links 3 & 4 Var 2
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00
NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.00
Floodplains (count)	0	0
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	1	1
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	1	1
Cultural Resource Land Cover (acres)		
Class A	4.03	2.62
Class B	28.18	31.48
Class C	70.72	67.54
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	1	1
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Comparison Name	Region 5 Link 7 APR	Region 5 Link 7 Var 1
Overview		
Total Length (mi)	1.07	1.27
Total Acreage (ROW - 200 ft)	25.23	30.22
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	4	3
Existing Transmission Parallel (mi)	1.01	0.29
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.00	0.00
All Road Crossings (count)	0	0
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	1	1
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	1.01	0.29
NLCD 2011 Land Cover (acres)		
Pasture/Hay	15.30	18.46
Barren Land	0.00	0.00
Grassland Herbaceous	0.00	0.00
Shrub/Scrub	0.00	0.00
Cultivated Crops	0.00	0.00
Total Agricultural and Open Lands	15.30	18.46
Forested Areas	9.71	11.75
Urban/Developed Areas	0.22	0.00
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	1	0
100-250 ft	1	0
250 - 500 ft	1	2
500 - 1000 ft	0	3
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	1	0
250 - 500 ft	1	4

	Region 5 Link 7 APR	Region 5 Link 7 Var 1
Structure Proximities (cont'd)		
500 - 1000 ft	0	2
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	21.64	25.21
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.92	0.04
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	26.00	31.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	0.00	0.00
High Wind Erosion Potential	21.65	25.22
Shallow Bedrock	1.58	3.67
Hydric Soils	0.00	0.00
Stony Soils	3.61	4.93
High Corrosion Potential	23.68	26.50
High Compaction Potential	0.00	0.00
Shale Plays (acres)	25.23	30.22
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	0.00	0.00
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.04	0.04
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 5 Link 7 APR	Region 5 Link 7 Var 1
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00

NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.00
Floodplains (count)	0	0
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	1
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	0
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	2	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	2	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	0.42	0.00
Class B	15.65	18.85
Class C	9.16	11.37
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Comparison Name	Region 6 Link 2 APR	Region 6 Link 2 Var 1
Overview		
Total Length (mi)	2.00	2.61
Total Acreage (ROW - 200 ft)	47.79	62.66
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	13	13
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.07	0.02
All Road Crossings (count)	1	1
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.07	0.02
NLCD 2011 Land Cover (acres)		
Pasture/Hay	0.00	0.00
Barren Land	0.00	0.00
Grassland Herbaceous	0.00	0.00
Shrub/Scrub	0.00	0.00
Cultivated Crops	45.35	60.18
Total Agricultural and Open Lands	45.35	60.18
Forested Areas	0.00	0.00
Urban/Developed Areas	1.94	1.61
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	1	1
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0

	Region 6 Link 2 APR	Region 6 Link 2 Var 1
Structure Proximities (cont'd)		
500 - 1000 ft	1	1
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	19.19	18.44
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.00	0.00
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	47.78	62.65
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	0.00	0.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	29.90	46.43
High Wind Erosion Potential	17.81	16.23
Shallow Bedrock	16.88	21.23
Hydric Soils	0.00	0.00
Stony Soils	0.00	0.00
High Corrosion Potential	29.97	46.43
High Compaction Potential	29.90	46.43
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	47.79	62.66
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.13	0.37
NWI Forested Wetlands (count)	0	1
NWI Non-Forested Wetlands (count)	2	1
NWI Forested Crossings >1,000 ft	0	1

	Region 6 Link 2 APR	Region 6 Link 2 Var 1
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.91

NWI Non-Forested Wetlands (acres)	0.30	0.25
NLCD Forested Wetlands (count)	2	2
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	1
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.75	1.13
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.00
Floodplains (count)	0	0
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	2	3
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	47.04	61.53
Class B	0.00	0.00
Class C	0.75	1.13
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN
CLEAN LINE

Comparison Name	Region 7 Link 1 APR	Region 7 Link 1 Var 1
Overview		
Total Length (mi)	0.69	0.92
Total Acreage (ROW - 200 ft)	15.97	21.54
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	5	3
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.07	0.00
All Road Crossings (count)	0	0
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.07	0.00
NLCD 2011 Land Cover (acres)		
Pasture/Hay	0.00	0.00
Barren Land	0.00	0.00
Grassland Herbaceous	0.00	0.00
Shrub/Scrub	0.00	0.00
Cultivated Crops	15.80	21.44
Total Agricultural and Open Lands	15.80	21.44
Forested Areas	0.00	0.00
Urban/Developed Areas	0.17	0.10
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	1
500 - 1000 ft	1	0
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	1
250 - 500 ft	0	1

	Region 7 Link 1 APR	Region 7 Link 1 Var 1
Structure Proximities (cont'd)		
500 - 1000 ft	2	0
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	0.00	0.00
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.00	0.00
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	15.97	21.54
Landslide Suceptibility - Moderate (acres)	0.00	0.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	15.97	21.54
Soil Limitations (acres)		
High Water Erosion Potential	0.00	0.00
High Wind Erosion Potential	0.00	0.00
Shallow Bedrock	0.00	0.00
Hydric Soils	15.97	21.54
Stony Soils	0.00	0.00
High Corrosion Potential	15.97	21.54
High Compaction Potential	15.97	21.54
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	0.00	0.00
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.03	1.06
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00

NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.00
Floodplains (count)	0	0
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	1	1
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	15.97	21.54
Class B	0.00	0.00
Class C	0.00	0.00
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Comparison Name	Region 7 Link 1 APR	Region 7 Link 1 Var 2
Overview		
Total Length (mi)	4.38	4.01
Total Acreage (ROW - 200 ft)	105.65	96.48
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	19	15
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.65	1.24
All Road Crossings (count)	3	4
Interstate, US, & State Highway Crossings (count)	1	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.65	1.24
NLCD 2011 Land Cover (acres)		
Pasture/Hay	0.00	0.34
Barren Land	0.00	0.00
Grassland Herbaceous	0.00	0.28
Shrub/Scrub	0.00	0.00
Cultivated Crops	89.63	81.46
Total Agricultural and Open Lands	89.63	82.08
Forested Areas	0.74	0.58
Urban/Developed Areas	3.37	2.75
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	1
500 - 1000 ft	0	1
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0

	Region 7 Link 1 APR	Region 7 Link 1 Var 2
Structure Proximities (cont'd)		
500 - 1000 ft	0	0
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	0.00	0.00
Farmlands of Statewide Importance (acres)	0.41	0.00
Slopes Greater than 20% (acres)	0.00	0.00
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	105.62	96.46
Landslide Suceptibility - Moderate (acres)	0.00	0.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	105.62	96.46
Soil Limitations (acres)		
High Water Erosion Potential	31.90	20.78
High Wind Erosion Potential	35.98	32.86
Shallow Bedrock	0.00	0.00
Hydric Soils	5.81	11.73
Stony Soils	0.00	0.00
High Corrosion Potential	92.80	88.70
High Compaction Potential	85.54	79.10
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	0.00	0.00
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.76	0.45
NWI Forested Wetlands (count)	10	10
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	6	6

	Region 7 Link 1 APR	Region 7 Link 1 Var 2
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	14.96	17.65
NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	10	6
NLCD Non-Forested Wetlands (count)	1	2
NLCD Forested Crossings > 1,000 ft (count)	3	4
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	11.51	10.32
NLCD Non-Forested Wetlands Acres	0.13	0.19
Floodplains (acres)	97.03	90.18
Floodplains (count)	2	2
Floodplains - Crossings > 1,000 ft (count)	2	2
Major Waterbodies (count)	1	1
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	4	2
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	1	1
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	92.63	84.93
Class B	0.13	0.47
Class C	12.10	10.42
Class W	0.78	0.67
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	1	1

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Comparison Name	Region 7 Link 5 APR	Region 7 Link 5 Var 1
Overview		
Total Length (mi)	1.23	1.26
Total Acreage (ROW - 200 ft)	29.02	29.91
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	9	12
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.10	0.22
All Road Crossings (count)	1	1
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.10	0.22
NLCD 2011 Land Cover (acres)		
Pasture/Hay	1.36	0.00
Barren Land	0.00	0.00
Grassland Herbaceous	0.00	0.00
Shrub/Scrub	3.29	2.82
Cultivated Crops	15.83	16.33
Total Agricultural and Open Lands	20.49	19.15
Forested Areas	6.99	9.51
Urban/Developed Areas	1.54	1.25
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	0	1
250 - 500 ft	2	0
500 - 1000 ft	4	9
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	2

	Region 7 Link 5 APR1	Region 7 Link 5 Var 1
Structure Proximities (cont'd)		
500 - 1000 ft	4	3
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	9.86	10.10
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.00	0.00
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	0.00	0.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	29.02	29.91
Soil Limitations (acres)		
High Water Erosion Potential	29.02	29.91
High Wind Erosion Potential	0.00	0.00
Shallow Bedrock	1.69	3.15
Hydric Soils	1.70	1.89
Stony Soils	0.00	0.00
High Corrosion Potential	1.91	2.04
High Compaction Potential	29.02	29.91
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	0.00	0.00
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.08	0.08
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	Region 7 Link 5 APR	Region 7 Link 5 Var 1
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00
NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.00
Floodplains (count)	0	0
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	0
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	17.65	18.24
Class B	4.05	2.90
Class C	7.32	8.78
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	1	1
FAA Private Airports & Heliports (count 25,000 ft)	1	1
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Comparison Name	DEIS 3A - adj	FEIS 3A - adj
Overview		
Total Length (mi)	0.61	0.45
Total Acreage (ROW - 200 ft)	14.01	10.22
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	8	3
Existing Transmission Parallel (mi)	0.12	0.00
Existing Transmission Crossings (count)	0	1
Road Parallel (mi)	0.05	0.00
All Road Crossings (count)	1	1
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	1
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.17	0.00
NLCD 2011 Land Cover (acres)		
Pasture/Hay	4.88	0.00
Barren Land	0.00	0.00
Grassland Herbaceous	8.34	9.27
Shrub/Scrub	0.00	0.00
Cultivated Crops	0.00	0.00
Total Agricultural and Open Lands	13.22	9.27
Forested Areas	0.00	0.50
Urban/Developed Areas	0.79	0.45
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	0	1
250 - 500 ft	0	0
500 - 1000 ft	3	3
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	1	1
250 - 500 ft	0	0

	DEIS 3A - adj	FEIS 3A - adj
Structure Proximities (cont'd)		
500 - 1000 ft	5	0
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	5.54	4.47
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.00	0.00
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	14.01	10.22
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	0.00	0.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	3.56	0.00
High Wind Erosion Potential	0.00	0.00
Shallow Bedrock	0.00	0.00
Hydric Soils	0.00	0.00
Stony Soils	0.00	0.00
High Corrosion Potential	7.73	4.59
High Compaction Potential	14.01	10.22
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	0.00	0.00
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.00	0.00
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	DEIS 3A - adj	FEIS 3A - adj
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00

NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.00	0.00
Floodplains (count)	0	0
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	4.87	4.46
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	0
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	0.51	0.45
Class B	13.50	9.11
Class C	0.00	0.66
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	1	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Comparison Name	DEIS 5B - adj	FEIS 5B - adj
Overview		
Total Length (mi)	1.13	1.01
Total Acreage (ROW - 200 ft)	26.76	23.75
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	5	5
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.00	0.00
All Road Crossings (count)	0	0
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.00	0.00
NLCD 2011 Land Cover (acres)		
Pasture/Hay	2.70	2.65
Barren Land	0.00	0.00
Grassland Herbaceous	0.23	0.76
Shrub/Scrub	0.31	4.22
Cultivated Crops	0.00	0.00
Total Agricultural and Open Lands	3.24	7.63
Forested Areas	23.51	16.11
Urban/Developed Areas	0.00	0.00
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	1	0
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0

	DEIS 5B - adj	FEIS 5B - adj
Structure Proximities (cont'd)		
500 - 1000 ft	0	0
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	14.19	13.85
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.85	2.29
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	27.00	24.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	0.00	0.00
High Wind Erosion Potential	2.90	2.42
Shallow Bedrock	2.99	13.43
Hydric Soils	0.00	0.00
Stony Soils	5.14	13.57
High Corrosion Potential	19.55	5.80
High Compaction Potential	4.21	4.52
Shale Plays (acres)	26.76	23.75
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	26.76	23.75
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.00	0.00
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	DEIS 5B - adj	FEIS 5B - adj
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00

NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	4.70	4.90
Floodplains (count)	2	2
Floodplains - Crossings > 1,000 ft (count)	2	2
Major Waterbodies (count)	0	0
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	0
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	0.00	0.00
Class B	3.20	7.58
Class C	23.56	16.16
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Comparison Name	DEIS 5E - adj	FEIS 5E - adj
Overview		
Total Length (mi)	0.54	0.54
Total Acreage (ROW - 200 ft)	12.27	12.30
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	8	8
Existing Transmission Parallel (mi)	0.00	0.00
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	0.08	0.05
All Road Crossings (count)	1	1
Interstate, US, & State Highway Crossings (count)	0	0
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	0	0
Total Paralleling Existing Linear Infrastructure (mi)	0.08	0.05
NLCD 2011 Land Cover (acres)		
Pasture/Hay	3.12	0.53
Barren Land	0.00	0.00
Grassland Herbaceous	0.00	0.00
Shrub/Scrub	0.00	0.00
Cultivated Crops	0.00	0.00
Total Agricultural and Open Lands	3.12	0.53
Forested Areas	8.67	11.32
Urban/Developed Areas	0.47	0.45
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	0	0
100-250 ft	1	1
250 - 500 ft	0	0
500 - 1000 ft	3	5
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0

	DEIS 5E - adj	FEIS 5E - adj
Structure Proximities (cont'd)		
500 - 1000 ft	1	1
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	0.00	0.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	0.01	0.40
Farmlands of Statewide Importance (acres)	0.00	0.00
Slopes Greater than 20% (acres)	0.77	0.80
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	0.00	0.00
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	12.00	12.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	0.00	0.00
Soil Limitations (acres)		
High Water Erosion Potential	0.00	0.00
High Wind Erosion Potential	3.60	4.38
Shallow Bedrock	2.43	1.95
Hydric Soils	0.00	0.00
Stony Soils	7.79	7.72
High Corrosion Potential	8.96	10.14
High Compaction Potential	0.71	0.00
Shale Plays (acres)	12.27	12.30
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	9.91	10.02
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.00	0.00
NWI Forested Wetlands (count)	0	0
NWI Non-Forested Wetlands (count)	0	0
NWI Forested Crossings >1,000 ft	0	0

	DEIS 5E - adj	FEIS 5E - adj
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	0.00	0.00
NWI Non-Forested Wetlands (acres)	0.00	0.00
NLCD Forested Wetlands (count)	0	0
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	0	0
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	0.00	0.00
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	0.31	0.31
Floodplains (count)	2	1
Floodplains - Crossings > 1,000 ft (count)	0	0
Major Waterbodies (count)	1	1
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	0	0
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	0	0
National Rivers Inventory (count)	1	1
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	0	0
Cultural Resource Land Cover (acres)		
Class A	0.47	0.45
Class B	2.78	0.13
Class C	9.02	11.71
Class W	0.00	0.00
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	1	1
Private Airstrips (count 1 mile)	0	0
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Quantitative Analysis

Based on 200ft ROW

Date Prepared: 6.26.2015
State: Oklahoma

PLAINS & EASTERN CLEAN LINE

Comparison Name	DEIS 6A - adj	FES 6A - adj
Overview		
Total Length (mi)	16.23	15.67
Total Acreage (ROW - 200 ft)	392.82	379.34
Parcels & Infrastructure Parallel		
Parcels Crossed (count)	63	60
Existing Transmission Parallel (mi)	0.11	0.11
Existing Transmission Crossings (count)	0	0
Road Parallel (mi)	1.98	1.98
All Road Crossings (count)	11	11
Interstate, US, & State Highway Crossings (count)	3	3
Pipeline Parallel (mi)	0.00	0.00
Pipeline Crossings (count)	0	0
Railroad Crossings (count)	1	1
Total Paralleling Existing Linear Infrastructure (mi)	2.10	2.10
NLCD 2011 Land Cover (acres)		
Pasture/Hay	0.00	0.00
Barren Land	0.00	0.00
Grassland Herbaceous	0.00	0.00
Shrub/Scrub	0.00	0.00
Cultivated Crops	326.06	313.69
Total Agricultural and Open Lands	326.06	313.69
Forested Areas	0.00	0.00
Urban/Developed Areas	21.70	20.59
Structure Proximities (count)		
K-12 Schools. Colleges, and Universities		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Churches		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Hospitals		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	0	0
500 - 1000 ft	0	0
Residences		
0-100 ft	1	1
100-250 ft	1	1
250 - 500 ft	2	2
500 - 1000 ft	4	4
Agricultural, Commercial, Industrial		
0-100 ft	0	0
100-250 ft	0	0
250 - 500 ft	1	1

	DEIS 6A - adj	FEIS 6A - adj
Structure Proximities (cont'd)		
500 - 1000 ft	3	3
Government Jurisdictions (acres)		
Cities & Towns	0.00	0.00
National Forest - Admin Boundary	0.00	0.00
National Forest - Federal-Owned	0.00	0.00
National Wildlife Refuges Aquistion Boundary (USFWS)	1.00	1.00
National Parks	0.00	0.00
USACE Lands	0.00	0.00
DOD Lands	0.00	0.00
State Parks		
Oklahoma State Parks	0.00	0.00
Arkansas State Parks	0.00	0.00
Tennessee State Parks	0.00	0.00
State-Owned WMA's		
Oklahoma WMA's	0.00	0.00
Tennessee WMA's	0.00	0.00
Arkansas Leased WMA's		
Oklahoma School Lands	0.00	0.00
Arkansas Natural Areas	0.00	0.00
Tennessee Natural Areas	0.00	0.00
County, Municipal Conservation Areas	0.00	0.00
Tribal Trust Lands and Allotments	0.00	0.00
Conservation Easements (acres)		
Federal Conservation Easements	0.00	0.00
State Conservation Easements	0.00	0.00
The Nature Conservancy Easments	0.00	0.00
Soil, Geologic, or Topographic Resources (acres)		
Prime Farmland (acres)	113.34	103.67
Farmlands of Statewide Importance (acres)	25.34	25.34
Slopes Greater than 20% (acres)	0.00	0.00
Karst Areas (acres)	0.00	0.00
Landslide Incidence - High (acres)	0.00	0.00
Landslide Incidence - Moderate (acres)	0.00	0.00
Landslide Incidence - Low (acres)	392.74	379.26
Landslide Suceptibility - High (acres)	0.00	0.00
Landslide Suceptibility - Moderate (acres)	0.00	0.00
Mineral Plants - Count 1000 ft	0	0
Fault Lines - Total Crossed	0	0
Earthquake Epicenters - Count 1000 ft: Class 3.5 -3.9	0	0
Earthquake Epicenters - Count 1000 ft: Class > 4.0	0	0
Peak Horizontal Acc. with 10 % Probability of Exceedance in 50 Yrs (acres)	355.97	355.97
Soil Limitations (acres)		
High Water Erosion Potential	294.35	290.53
High Wind Erosion Potential	97.28	87.61
Shallow Bedrock	235.33	231.51
Hydric Soils	147.16	147.16
Stony Soils	0.00	0.00
High Corrosion Potential	367.81	364.00
High Compaction Potential	372.65	368.83
Shale Plays (acres)	0.00	0.00
Biological Resources		
Designated Critical Habitat (acres)	0.00	0.00
Native Prairies (acres)	0.00	0.00
SGP CHAT -- Rank 1 (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 (acres)	0.00	0.00
SGP CHAT -- Rank 1 -- Existing Impact (acres)	0.00	0.00
SGP CHAT -- Rank 2&3 -- Existing Impact (acres)	0.00	0.00
LPC Lek (acres)	0.00	0.00
Ozark Big-Eared Bat Potential Occurrence Area (acres)	0.00	0.00
Gray Bat Potential Occurrence Area (acres)	0.00	0.00
Indiana Bat Potential Occurrence Area (acres)	249.52	236.03
Whooping Crane Sitings (count 1 mile)	0	0
ABB Potential Occurrence Area (acres)	0.00	0.00
Water Resources		
NHD Flowlines (mileage withing ROW)	0.00	0.00
NWI Forested Wetlands (count)	12	12
NWI Non-Forested Wetlands (count)	2	1
NWI Forested Crossings >1,000 ft	6	6

	DEIS 6A - adj	FEIS 6A - adj
Water Resources (cont'd)		
NWI Non-Forested Crossings > 1,000 ft	0	0
NWI Forested Wetlands (acres)	21.23	21.23

NWI Non-Forested Wetlands (acres)	0.43	0.19
NLCD Forested Wetlands (count)	8	7
NLCD Non-Forested Wetlands (count)	0	0
NLCD Forested Crossings > 1,000 ft (count)	6	6
NLCD Non-Forested Crossings > 1,000 ft (count)	0	0
NLCD Forested Wetlands Acres	25.17	25.12
NLCD Non-Forested Wetlands Acres	0.00	0.00
Floodplains (acres)	129.37	129.37
Floodplains (count)	1	1
Floodplains - Crossings > 1,000 ft (count)	1	1
Major Waterbodies (count)	1	1
State-Designated Waterbodies (count)	0	0
Other Waterbodies (count)	5	5
Nutrient Vulnerable Groundwater (acres)	0.00	0.00
Wellhead Protection Areas (acres)	0.00	0.00
Groundwater Wells (count 1000 ft)	7	7
National Rivers Inventory (count)	0	0
Special Source Groundwater (acres)	0.00	0.00
Springs 0 - 250 ft (count)	0	0
Springs 250 - 500 ft (count)	0	0
Wild and Scenic Rivers (count)	0	0
Visual / Cultural Resources		
Federally and State-Designated Scenic Routes, Trails, and Byways (count)	0	0
NRHP Listed Sites (count 1000 ft)	0	0
Recorded Cultural or Historical Sites		
Archeological Sites (count ROW)	0	0
GLO Sites (count 1000 ft)	0	0
Historical Sites (count 1000 ft)	0	0
Total Recorded Cultural or Historical Sites (count 1000 ft)	0	0
Cemeteries (count 1000 ft)	1	1
Cultural Resource Land Cover (acres)		
Class A	350.01	336.57
Class B	0.00	0.00
Class C	25.17	25.12
Class W	17.64	17.64
Aviation Facilities		
FAA Public Airports (count 25,000 ft)	0	0
FAA Private Airports & Heliports (count 25,000 ft)	0	0
Private Airstrips (count 1 mile)	1	1
Environmental Contamination Sites		
EPA Listed Sites (count 1000 ft)	0	0

Exhibit 4, Clean Line Route Variation Data Responses

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This exhibit includes details about the route variations that have been adopted for consideration in the Final EIS. Table M.2-1 of Appendix M provides a list of the route variations analyzed in the Final EIS (and any required route adjustments) and the affected counties where those route variations are located. The text below describes the route variations in detail and whether the route variation replaces the original Applicant Proposed Route or is carried forward in addition to the Applicant Proposed Route in the Final EIS analysis.

REGION 2

Link 1, Variation 1

This route variation is located in Region 2 in Woodward County, Oklahoma. A landowner in this area submitted a comment with two supporting diagrams detailing potential variations to DOE. The landowner expressed concerns about the representative ROW's alignment across cultivated fields and proximity to springs used for irrigation. In subsequent conversations with Clean Line representatives, the landowners indicated concerns about the representative ROW's proximity to a barn and former homestead structure and home site. Following the publication of the Draft EIS, Clean Line also learned new information regarding a potential cultural area and tribal area of interest in the area of the representative ROW. As a result, Clean Line coordinated directly with the landowner to identify a technically feasible route variation that could address both the landowner's concerns and potentially minimize adverse effects to cultural resources.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

Link 2, Variation 2

This route variation is located in Region 2 in Major County, Oklahoma.

As provided to the DOE in Clean Line's April 2015 description of Link 2, Variation 1, several landowners along 6.5 miles of an east-west portion of the Applicant Proposed Route requested that Clean Line consider a route variation that would reduce the potential for impacting agricultural operations on several of their parcels. Based on conversations with these landowners, Clean Line identified a route variation south of the Applicant Proposed Route and closer to the quarter section line that paralleled parcel boundaries. This route variation addressed concerns raised by these landowners about the Applicant Proposed Route's potential interference with agricultural operations and also increased the distance from an existing home. After providing information to the DOE about Link 2, Variation 1, Clean Line coordinated with a landowner to the east of this route variation to identify a technically feasible route that would increase the Applicant Proposed Route's distance from an existing home. As a result, Clean Line developed Link 2, Variation 2, which continues the alignment of Link 2, Variation 1, approximately 3 miles farther east before rejoining the Applicant Proposed Route in Section 18, T20N, R10W.

Clean Line has determined this variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

REGION 3

Link 1, Variation 2

This route variation is located in Payne County, Oklahoma. A landowner in this area submitted a comment and map with a suggested variation to DOE. The landowner expressed concerns about the representative ROW's proximity to an existing home and alignment across no-till, cultivated cropland in Section 12, T18N, R01W. The landowner conveyed the same information to Clean Line during a Draft EIS public meeting. Clean Line subsequently coordinated with the landowner to identify a route variation that would address the landowner's concerns. This route variation would increase the distance from the existing home and is consistent with the landowner's communications with Clean Line and comment to the DOE.

Clean Line has determined this variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

Links 1 and 2, Variation 1

This route variation is located in Payne County, Oklahoma. This route variation is prompted by two new residential subdivisions along the Applicant Proposed Route. One of the subdivisions divides a significant portion of the NE ¼ of Section 15, T18N, R02E into smaller parcels. Clean Line's recent conversations with landowners and field verification revealed that three new homes were constructed in this subdivision in 2013 and 2014. The other subdivision is located in the NE ¼ of Section 14, T18N, R02E. Field verification of this site revealed a new home was constructed within the representative ROW in 2014. To avoid the new homes associated with these residential areas Clean Line identified a route variation south of the Applicant Proposed Route that would increase the distance from nearby houses and parallel adjacent parcels' boundaries. This variation would continue east along property boundaries and north of the subdivision in Section 14, T18N, R02E before crossing U.S. Highway 177 (also known as S. Perkins Road) on the eastern end of the variation. The variation would address concerns raised by landowners and reduce the number of residential parcels crossed.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

Link 4, Variation 1

This route variation is located in Lincoln County, Oklahoma. Field reconnaissance conducted by Clean Line revealed the Applicant Proposed Route alignment crosses portions of an operational quarry located on several parcels under common ownership in Section 21, T17N, R05E. Clean Line identified a variation west of the Applicant Proposed Route that angles towards the southeast before re-joining the Applicant Proposed Route and following boundaries of eastern adjacent parcels. This variation would address Clean Line's concerns about impacts to the quarry operation. Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

Link 4, Variation 2

This route variation is located in Creek County, Oklahoma. A landowner in this area submitted a comment to DOE, notifying the agency of a new home being constructed in Section 26, T17N, R08E. Separately, the landowner contacted Clean Line to present the same information regarding the future building site and suggested a route variation. Clean Line coordinated with the landowner to identify a route variation that would address the landowner's concerns. The route variation would avoid the new home site and is consistent with the landowner's communications with Clean Line and comment to the DOE.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

Link 5, Variation 2

This route variation is located in Region 3 in Muskogee County, Oklahoma.

As provided to the DOE in Clean Line's April 2015 description of Link 5, Variation 1, Clean Line identified a home in the NW ¼ of Section 14, T14N, R17E that had not been detected during route development or subsequently analyzed in the Draft EIS. In addition, a neighboring landowner conveyed to Clean Line a desire to host as much right-of-way on their land as possible. This variation, located north and east of the Applicant Proposed Route, accommodates this landowner's request and avoids the newly identified home. Since Clean Line provided this variation to the DOE for its analysis, the landowner originally requesting the variation provided additional information to Clean Line, expressing concern that the variation crosses the landowner's driveway and primary entrance to their property. In order to address the landowner's concerns about the representative ROW crossing their primary entrance, Clean Line explored additional technically feasible alternatives to Link 5, Variation 1. As a result, Clean Line developed Link 5, Variation 2 in concert with the landowner originally requesting the variation and the landowner of the neighboring property to the east. This revised variation—Link 5, Variation 2—continues further east into Section 11, T14N, R17E before turning south and re-joining the alignment of Link 5, Variation 1 in Section 14, T14N, R17E. Consistent with Link 5, Variation 1, this revised variation would still reduce the number of landowners affected and the total number of homes in proximity to the route.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

REGION 4

Link 3, Variation 1

This route variation is located in Sequoyah County, Oklahoma. A landowner in Section 23, T12N, R24E contacted Clean Line to share concerns about potential impacts to their property. Clean Line also acquired new information that identified a cemetery near the Applicant Proposed Route in this area. The landowner suggested the Applicant Proposed Route be moved north to parallel property lines that would reduce the impacts to their property and also increases the distance from their home. Based on this consultation, Clean Line identified a route variation north of the

Applicant Proposed Route that would parallel parcel boundaries, increase the distance from the landowner's home, while avoiding the newly identified cemetery. This variation would also decrease the total number of homes in proximity to the route.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

Link 3, Variation 2

This route variation is located in Sequoyah County, Oklahoma. A landowner in this area submitted written and oral comments to the DOE suggesting a route variation and providing new information. The landowner expressed concern about two airstrips, their residence, an agri-tourism operation, and a commercial cabin and resort area. The landowner also expressed a preference that the Applicant Proposed Route follow existing parcel boundaries and be located parallel to an existing transmission line in a different part of their property. The comment also indicated that the landowner had worked with other landowners in the area to develop the route variation.

Representatives from Clean Line coordinated directly with the commenter (and other landowners potentially affected by the route variation) when evaluating the landowner's original suggestion. Clean Line determined that the original suggestion would have intersected an existing residence on an adjacent parcel in the western portion of the route variation. To avoid this home, Clean Line identified a route variation that would maximize the length parallel to an existing Southwestern Power Administration (Southwestern) transmission line to the north, avoid a home on an adjacent parcel to the west, and address the landowner's concerns. This route variation is slightly different from the landowner's original route suggestion in Sections 13 and 14, T12N, R22E, but closely follows the original Applicant Proposed Route in Sections 14, 15, 16, 17, and 18, T12N, R23E.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward both the proposed changes to the Applicant Proposed Route and the original Applicant Proposed Route in the Final EIS.

Link 3, Variation 3

This route variation is located in Region 4 in Crawford County, Arkansas. The City of Fort Smith, Arkansas, owns certain parcels located in Sections 4 and 5, T09N, R32W, and Sections 31 and 32, T10N, 32W in Arkansas and in Section 21, T12N, R27E in Oklahoma. The City of Fort Smith's Utility Department (Utility Department) submitted a comment to DOE that provided new information about the presence of protected species in the area. The comment included information about a January 2015 discovery of federally protected (endangered) Ozark big-eared bats in two winter cave hibernacula near the Lee Creek Reservoir within the Applicant Proposed Route's ROI in Region 4 as described in Section 3.14.1.7.2.6.1.4 in the Final EIS. This information was confirmed by biologists from the Arkansas Game and Fish Commission. The Utility Department expressed concern that other federally protected bats could also be present in nearby suitable habitat. In addition, the Oklahoma Department of Wildlife Conservation (ODWC) specifically objected to the "Lee Creek Variation" in the area of the state line between Arkansas and Oklahoma. The ODWC's comment (Richard T. Hatcher, Director, ODWC; letter to DOE received April 21, 2015) expressed concerns regarding potential adverse effects resulting from clearing and new access roads in the Lee Creek area and adjacent riparian zones. ODWC asserted that the route “should follow the Applicant Proposed Route which runs parallel to Southwestern's existing Gore-to-Alma 161kV transmission line.” The route variation described below overlaps the eastern end of the Lee Creek Variation.

To address the Fort Smith Utility Department’s concern about protected species in the area, Clean Line evaluated technically feasible and reasonable route variations that would avoid the documented hibernacula. During its subsequent engineering reviews and analyses, Clean Line identified constraints associated with abundant complex topography in the area, the presence of recreational trails and a natural water feature (Teardrop Falls) north of the Lee Creek Reservoir. These constraints, combined with the documented presence of protected bat species and locations of existing residences, precluded technically feasible and reasonable options for micrositing the representative ROW within the Applicant Proposed Route and limited technically feasible and reasonable options for route variations in the area.

As a result, Clean Line identified a route variation that would address the Utility Department’s concerns about the known locations of protected bat species. This route variation also addresses ODWC’s concerns by following the Applicant Proposed Route and Southwestern’s 161kV transmission line to the extent practicable and avoiding or minimizing clearing in riparian areas. This variation resolves engineering constraints associated with complex terrain and proximity to recreational trails, Teardrop Falls, and locations of existing residences. The resulting route variation starts from the Applicant Proposed Route and turns north for ½ mile in Section 31, T10N, R32W before turning east for approximately 2.5 miles in Sections 32 and 33, T10N, R32W, where it re-joins the Applicant Proposed Route in Section 34, T10N, R32W. This route variation is shorter than the corresponding segment of the Applicant Proposed Route, crosses fewer parcels, and more closely follows parcel boundaries. The route variation also includes one fewer church within 1,000 feet of the representative ROW and reduces the potential for encountering cultural resources. To address the Utility Department’s concern, the route variation reduces the amount of forested land crossed by more than 16 acres and also reduces the amount of Ozark big-eared bat occurrence area by nearly 6 acres.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

Link 6, Variation 1

This route variation is located in Crawford County, Arkansas. A landowner in this area notified Clean Line of a new home planned for construction in the SW ¼ of Section 32, T10N, R31W, as well as two newly constructed homes located directly adjacent to the Applicant Proposed Route. Clean Line identified a route variation to the south parallel to parcel boundaries. The route variation avoids the proposed site for this home and increases the distance from the two newly constructed homes in the area.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

Link 6, Variation 2

This route variation is located in Crawford County, Arkansas. A landowner in this area notified Clean Line that the Applicant Proposed Route would cross the northwestern corner of a parcel subject to a Natural Resources Conservation Service Wetlands Reserve Program (WRP) easement in the NE ¼ of Section 12, T9N, R30W. Clean Line evaluated this new information and identified a variation to the northwest that would avoid crossing the parcel subject to the WRP easement.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

Link 6, Variation 3

This route variation is located in Region 4 in Crawford County, Arkansas. A landowner in Section 33, T10N, R31W submitted comments to DOE expressing concern about the proximity of the Applicant Proposed Route and representative ROW to a residence and complex terrain. These constraints and the locations of other existing residences limited technically feasible and reasonable options for micrositing the representative ROW within the Applicant Proposed Route. Upon further engineering evaluation, Clean Line identified a potential route variation that would address engineering constraints associated with complex terrain and locations of existing residences. Clean Line subsequently identified a technically feasible and reasonable route variation south of the Applicant Proposed Route in Section 33, T10N, R31W and Section 34, T10N, R31W that re-joins the Applicant Proposed Route in the middle portion of Section 34, T10N, R31W. The variation includes one fewer residence located within 100 feet of the representative centerline, one more residence located within 100 to 250 feet of the representative centerline, and four fewer residences located within 250 to 500 feet of the representative centerline. The variation minimizes engineering constraints due to terrain and, consistent with General and Technical Guidelines and routing criteria, crosses fewer parcels and parallels existing linear infrastructure for a slightly greater distance.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

Link 9, Variation 1

This route variation is located in Pope County, Arkansas. During field reconnaissance, Clean Line identified engineering constraints regarding the representative right-of-way's alignment over two bridges on Arkansas Highway 164 that span Big Piney Creek. Clean Line also identified potential constraints regarding the terrain's aspect and slope at the southern crossing of an existing Southwestern transmission line.

In addition, a landowner in Section 24, T10N, R21W contacted Clean Line to share concerns about a house located within the Applicant Proposed Route's representative right-of-way. This house, located inland from the south bank of Big Piney Creek and west of Arkansas Highway 164 and the existing Southwestern transmission line, was not previously identified during route development or subsequently analyzed in the Draft EIS. The landowner also commented that the Applicant Proposed Route location could impact an 11-acre campground located inland from the northern bank of Big Piney Creek and immediately west of Arkansas Highway 164 and the existing Southwestern transmission line.

Based on this input, Clean Line identified a route variation east of the Applicant Proposed Route and existing Southwestern transmission line. This route variation would avoid the home identified by the landowner, move the line away from the campground, and eliminate potential engineering challenges associated with both Arkansas Highway 164 bridges. The variation would maintain a parallel alignment to the existing Southwestern transmission line, while also resolving engineering constraints associated with the terrain and southern crossing of this line in S36, T10N, R21W.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

REGION 5

Link 1, Variation 2

This route variation is located in Region 5 in Pope County, Arkansas. A landowner in Section 9, T09N, R20W and Section 10, T9N, R20W submitted comments to DOE that provided new information about the location of a newly-built residence. These comments expressed concern about the proximity of the Applicant Proposed Route and representative ROW to this home site. As a result, Clean Line evaluated potential route variations that would address the landowner’s concern. Clean Line identified a technically feasible route variation south of the Applicant Proposed Route in Section 9, T09N, R20W and Section 10, T09N, R20W that re-joins the Applicant Proposed Route in Section 11,T09N, R20W. This route variation would avoid the home site referenced in the landowner’s comment. In addition, this route variation would, consistent with General and Technical Guidelines and routing criteria, maximize the distance from a greater number of residences in this area, minimize the total number of parcels crossed, reduce the acreage of floodplain within the representative ROW, and reduce the number of floodplains crossed.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

Link 2, Variation 2

This route variation is located in Pope County, Arkansas. A landowner in this area submitted a comment to DOE expressing concerns about the representative ROW’s alignment across specific areas of an active commercial forestry operation (tree farm) in Section 32, T09N, R18W. The landowner suggested two potential route variations to DOE and also communicated their concerns and suggested route variations directly to Clean Line. As a result, Clean Line coordinated directly with the landowner to identify a single route variation that would traverse more compatible areas of the forestry operation in Section 29, T09N, R18W and Section 32, T09N, R18W, before following section and parcel boundaries, then re-joining the Applicant Proposed Route along the southern section boundary of Section 33, T09N, R18W. This route variation would address the landowner’s concerns.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

Links 2 and 3, Variation 1

This route variation is located in Pope County, Arkansas. Clean Line identified a home within the Applicant Proposed Route representative ROW in Section 11, T08N, R18W that had not been previously identified during route development or subsequently analyzed in the Draft EIS. In addition, a neighboring landowner suggested moving the Applicant Proposed Route onto their property. After consulting with each landowner and obtaining feedback, Clean Line identified a route variation west and south of the Applicant Proposed Route. This route variation would increase the distance from the newly identified home and reduce the number of landowners affected.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

Links 3 and 4, Variation 2

This route variation is located in Region 5 in Van Buren County, Arkansas. A landowner in Section 35, T09N, R13W submitted comments to DOE that provided new information about the location of an existing homestead dating back to the mid-19th century. The landowner expressed concern about the representative ROW's proximity to this homestead structure and appurtenant rock wall and roadbed. Clean Line subsequently confirmed the location of the homestead structure and coordinated with the landowner to identify potential micrositing options within the Applicant Proposed Route that would address the landowner's concerns. While exploring micrositing options, Clean Line discovered new information regarding several adjacent parcels with conservation easements approximately two to 3 miles east of the homestead site in Sections 31 and 32, T9N, R12W. These conservation easements are part of a streambank mitigation site along Cadron Creek. As a result, Clean Line developed a route variation north of the Applicant Proposed Route that more closely parallels parcel boundaries before re-rejoining the Applicant Proposed Route in Section 32, T09N, R12W. This route variation would avoid the homestead site referenced in the landowner's original comment and also avoid and/or minimize impacts to streambank resources protected by existing conservation easements.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

Link 7, Variation 1

This route variation is located in White County, Arkansas. An owner of multiple parcels in Section 18, T09N, R06W contacted Clean Line to share concerns about a house constructed in 2013 and 2014 that is located within the Applicant Proposed Route's representative right-of-way. This house, located approximately 200 feet from an existing 500kV transmission line, was not previously detected during route development or subsequently analyzed in the Draft EIS. After consulting with the landowner and a neighbor to the south, Clean Line identified a route variation south of the Applicant Proposed Route that would parallel an adjacent parcel's boundaries, as well as an existing pipeline easement, before turning north to reconnect with the Applicant Proposed Route. This route variation would increase the distance from the landowner's house.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

REGION 6

Link 2, Variation 1

This route variation is located in Region 6 in Jackson County, Arkansas. The tenant farmer of a landowner in Section 16, T10N, R02W submitted a comment and supporting diagram to DOE that detailed a potential variation north of the Applicant Proposed Route. The landowner's tenant farmer expressed concerns about the representative ROW's alignment potentially interfering with irrigation and aerial application of actively cultivated precision-leveled fields. Clean Line coordinated with the tenant farmer on the landowner's behalf to evaluate the route variation suggested to DOE. Clean Line determined the route variation suggested to DOE would increase the representative ROW's proximity to homes and potentially interfere with a center pivot irrigation system on a neighboring parcel. Subsequently, Clean Line communicated with the landowner's tenant to identify a technically feasible route variation that could address the tenant's concerns about interference with agricultural operations and still minimize adverse effects on neighboring properties.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

REGION 7

Link 1, Variation 1

This route variation is located in Mississippi County, Arkansas. Clean Line was contacted about the Applicant Proposed Route diagonal path through a parcel in Section 23, T10N, R08E. Concern was specifically raised that the route would interfere with crop irrigation or efficient aerial application of active agricultural fields. Clean Line identified a route variation that would follow parcel boundaries through the area, addressing concerns about potential impediments to agricultural operations on this parcel.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

Link 1, Variation 2

This route variation is located in Mississippi County, Arkansas, and Tipton County, Tennessee. A landowner in Section 19, T10N, R10E contacted Clean Line to provide information about agricultural operations on their parcel.

Specifically, the landowner expressed concerns that the Applicant Proposed Route could interfere with the paths of several center pivot irrigation systems, alter terrain of precision-leveled fields, and result in inefficient aerial application of these fields. The landowner provided Clean Line information about the locations and coverage area for the center pivot irrigation systems and suggested other areas where the Applicant Proposed Route might be located that would pose fewer constraints on the landowner's agricultural operations.

Clean Line also obtained new information from landowners in Sections 20 and 21, T10N, R10E that presented additional routing opportunities for developing a route variation in this area. A house identified in the Draft EIS on an eastern adjacent parcel near the Mississippi River is no longer present due to flooding. Using input from the landowners and new information obtained about the abandoned house, Clean Line identified a route variation south of the Applicant Proposed Route that would avoid bisecting adjacent parcels, interfering with current agricultural operations, and impeding the paths of center pivot irrigation systems, all while more closely following parcel boundaries.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

Link 5, Variation 1

This route variation, located in Shelby and Tipton counties, Tennessee, is part of the Proposed Right-of-Way approved by the Tennessee Regulatory Authority. Clean Line developed this route variation based on landowner feedback and based on new information, including the location of a proposed home site and planned residential area that was not identified during route development. The variation would avoid the proposed home site and addresses landowner concerns about the planned residential area.

Clean Line has determined this route variation is reasonable and technically feasible. DOE evaluated the information provided by Clean Line, conducted an independent comparison of the potential impacts to resources under the original Applicant Proposed Route versus each route variation, and chose to carry forward the proposed changes to the Applicant Proposed Route in the Final EIS.

APPENDIX N

FLOODPLAIN STATEMENT OF FINDINGS

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Summary

This Floodplain Statement of Findings was prepared by the U.S. Department of Energy (DOE) in support of a decision on whether and under what conditions it would participate in the Plains & Eastern Clean Line Project (Project). The Project would involve construction of an overhead high voltage direct current (HVDC) electric transmission system and associated facilities to deliver electric power, primarily from renewable energy generation facilities in the Oklahoma and Texas Panhandle regions, to the Mid-South and Southeast United States via an interconnection with the Tennessee Valley Authority (TVA) in Tennessee. Major facilities associated with the proposed Project consist of converter stations in Oklahoma and Tennessee; an approximate 720-mile HVDC transmission line; an alternating current collection system in the Oklahoma and Texas Panhandle regions; and access roads. This Statement of Findings has been prepared in accordance with 10 CFR Part 1022. The proposed electric power transmission system route would encounter floodplains designated by the Federal Emergency Management Agency. DOE has assessed the potential for adverse effects from the proposed Project on floodplains and Clean Line (the Applicant) has developed and committed to measures to avoid and minimize adverse effects on human life, property, and natural resources. DOE has determined that the Project would avoid floodplains to the maximum extent practicable, that appropriate measures to minimize adverse effects on human health and safety and the functions and values provided by floodplains would be taken, and that the Project would comply with applicable floodplain protection standards.

1. Introduction

This Floodplain Statement of Findings addresses the proposed Clean Line (or Applicant) overhead ± 600-kilovolt (kV) HVDC electric transmission system and associated facilities with the capacity to deliver approximately 3,500 megawatts (MW) primarily from renewable energy generation facilities in the Oklahoma and Texas Panhandle regions to the Mid-South and Southeast United States via an interconnection with the TVA in Tennessee. Major facilities associated with the Applicant Proposed Project consist of converter stations in Oklahoma and Tennessee; an approximate 720-mile HVDC transmission line; an alternating current (AC) collection system; and access roads. DOE Alternatives would increase the total capacity of the proposed transmission system by 500MW (to 4,000MW) to facilitate delivery of electricity to Arkansas. The DOE has prepared the Plains & Eastern Clean Line Transmission Project Environmental Impact Statement (EIS) concurrently with this Statement of Findings. Described in this Statement of Findings are (1) a description of DOE's Proposed Action; (2) a description of the Project; (3) justification for locating some elements of the Proposed Action in a floodplain; (4) description of the Project alternatives evaluated in the EIS; (5) determination of conformance with applicable floodplain protection standards; and (6) steps that would be implemented to avoid, minimize, and offset potential for adverse effects. An assessment of effects on floodplains was also incorporated into Chapter 3 of the EIS. Detailed maps depicting the route for the transmission line installation and the construction of associated structures along each segment of the Project are included in Appendix A of the EIS.

2. DOE Proposed Action

In 2010, DOE issued requests for proposals for new or upgraded transmission line projects under Section 1222 of the Energy Policy Act (EPAct) of 2005. In response to that request, Clean Line submitted a proposal for the Plains & Eastern Clean Line Transmission Project. DOE's action at this time, pursuant to its need to implement Section 1222 of the EPAct, is to decide whether and under what conditions it would participate in the Applicant Proposed Project.

Potential environmental impacts are one of several factors that DOE will consider when deciding whether to participate in the Project and the EIS evaluates those potential impacts. The identification of floodplains along the corridor of the Project and the evaluation of potential floodplain impacts are a component of EIS, specifically Section 3.19.Therefore, the EIS satisfies the requirement for a floodplain assessment under 10 CFR Part 1022, Compliance with Floodplain and Wetland Environmental Review, which establishes, among other things, the DOE policy for meeting its responsibilities under Executive Order (EO) 11988, Floodplain Management. EO 11988 directs federal agencies to implement floodplain management requirements through existing procedures and guidelines such as those established to implement the National Environmental Policy Act (NEPA) to the maximum extent practicable.

This Statement of Findings has been prepared in accordance with 10 CFR Part 1022, because DOE has found through its Project evaluation, including the floodplain assessment, that no practicable alternative to locating some elements of the Project in a floodplain is available. As required by 10 CFR 1022, this Statement of Findings also identifies measures to be taken to minimize potential harm to or within the floodplain. Per EO 11988, an agency may locate a facility in a floodplain if the head of the agency finds there is no practicable alternative and provided the agency minimizes potential harm to the floodplain and the agency circulates a notice explaining why the action is to be located in the floodplain prior to taking action. Finally, new construction in a floodplain must apply accepted flood proofing and flood protection, which would include elevating structures above the base flood level rather than raising the floodplain elevation through in-filling.

3. Description of Clean Line's Project

The Applicant Proposed Project would include an overhead ± 600kV HVDC electric transmission system and associated facilities with the capacity to deliver approximately 3,500MW primarily from renewable energy generation facilities in the Oklahoma and Texas Panhandle regions to the Mid-South and Southeast United States via an interconnection with the TVA in Tennessee. Major facilities associated with the Applicant Proposed Project consist of converter stations in Oklahoma and Tennessee; an approximate 720-mile, ± 600kV HVDC transmission line; an AC collection system; and access roads. The Project would include two AC/DC converter stations, one at each end of the transmission line, in Texas County, Oklahoma, and Shelby County, Tennessee, which would be connected to the existing grid. A typical converter station may require 45 to 60 acres and may contain up to two large (200 feet by 75 feet) buildings as well as smaller buildings. As described in Section 2.1.2.2.2 of the EIS, transmission line structures, depending on their size and type, would typically be placed at a rate of four to seven structures per mile, which equates to spans (between structures) ranging between about 1,300 and 750 feet. At river crossings, such as for the Arkansas and Mississippi rivers, larger structures would be used that can support spans in the range of 2,000 to 3,300 feet. The AC collection system would consist of multiple transmission lines to collect energy from generation resources in the Texas and Oklahoma Panhandle regions. Although the EIS identifies and evaluates 13 of these collection lines, ranging from about 13 to 56 miles in length, the Applicant anticipates that only four to six of these lines would be developed.

DOE Alternatives (addressed further in Section 5 below) would increase the total capacity of the proposed transmission system by 500MW (to 4,000MW) to facilitate delivery of electricity to Arkansas, which would be facilitated by the construction of an Arkansas converter station. The DOE Alternatives evaluated include reasonable alternative route segments along the entire length of the transmission line. To simplify and organize the analysis of impacts from the HVDC transmission line, DOE divided the 720-mile-long transmission line into seven sequential regions starting from the Oklahoma Panhandle (in Region 1) and ending in Tennessee (in Region 7). The EIS analysis addresses the floodplain areas that would be crossed by the 200-foot-wide representative right-of-way (ROW) for the transmission line (both the Applicant Proposed Route and the HVDC alternative routes) in each of the seven regions, the AC/DC Converter Station and AC Interconnection Siting Areas in Regions 1, 5, and 7 and the AC Collection System in Region 1. To support direct comparisons, the floodplain areas associated with the Project, as well as the DOE Alternatives, are presented in Section 5 below. Floodplain data evaluated in EIS, where available, are based on 100-year floods (i.e., the 1-percent annual-chance floodplain).

4. Justification for Locating the Project in a Floodplain

The 720-mile transmission line would run primarily west to east across numerous watershed systems where surface water flow has a strong southerly component as it drains toward the Mississippi River. Because of the west-to-east linear orientation of the Project with respect to southeasterly direction of the watersheds, there is no means by which to route the Project to avoid all drainage channels and the associated floodplains.

5. Descriptions of the Alternatives Considered

In addition to the No Action Alternative, DOE considered numerous segment alternative routes to the Applicant Proposed Route for the transmission line and also 22 route variations on the Applicant Proposed Route developed in response to comments on the Draft EIS. The floodplain areas that would be encountered by these HVDC alternative routes along with the areas encountered by the corresponding region of the Applicant Proposed Route are shown in Table 1. Except for two short HVDC alternative routes, 4-C in Region 4 and 6-B in Region 6, both the Applicant Proposed Route and the HVDC alternative route segments in each region would cross floodplains. In response to public comments on the Draft EIS, several route variations on the Applicant Proposed Route were developed. The route variations created minor increases and decreases in potential floodplain acreage in the ROW that resulted in no expected change in potential impacts to floodplains. Regardless of the routes selected in any of the regions, some construction activity, including possible erection of tower structures and clearing of vegetation, would occur within floodplains.

Table 1:
Summary of Floodplains by Number and Acreage in a 200-Foot-Wide Representative ROW for the HVDC Transmission Lines by Project Region

Region	Route Segment of HVDC Transmission Line	Segment Length (miles)[1]	Number of Floodplains	Floodplain Acreage in 200-Foot-Wide ROW
1	Applicant Proposed Route	115.9	2	52.4
	HVDC Alternative Route 1-A	123.0	1	5.3
	HVDC Alternative Route 1-B	51.8	2	6.0
	HVDC Alternative Route 1-C	52.0	1	5.3
2	Applicant Proposed Route	106.2	5	157.0
	HVDC Alternative Route 2-A	57.2	1	4.5
	HVDC Alternative Route 2-B	29.8	3	83.0
3	Applicant Proposed Route	162.1	20	293.8
	HVDC Alternative Route 3-A	37.6	9	43.6
	HVDC Alternative Route 3-B	47.7	11	60.5
	HVDC Alternative Route 3-C	121.6	17	305.6

Table 1:
Summary of Floodplains by Number and Acreage in a 200-Foot-Wide Representative ROW for the HVDC Transmission Lines by Project Region

Region	Route Segment of HVDC Transmission Line	Segment Length (miles)[1]	Number of Floodplains	Floodplain Acreage in 200-Foot-Wide ROW
	HVDC Alternative Route 3-D	39.3	7	91.5
	HVDC Alternative Route 3-E	8.5	2	21.2
4	Applicant Proposed Route	126.7	32	545.7
	HVDC Alternative Route 4-A	58.4	13	130.2
	HVDC Alternative Route 4-B	78.6	12	104.4
	HVDC Alternative Route 4-C	3	0	0
	HVDC Alternative Route 4-D	25.3	7	47.9
	HVDC Alternative Route 4-E	36.7	9	67.4
5	Applicant Proposed Route	113.2	14	111.1
	HVDC Alternative Route 5-A	12.6	2	13.7
	HVDC Alternative Route 5-B	71.0	8	159.5
	HVDC Alternative Route 5-C	9.2	1	19.2
	HVDC Alternative Route 5-D	21.7	1	4.1
	HVDC Alternative Route 5-E	36.3	5	93.1
	HVDC Alternative Route 5-F	22.3	3	74.7
6	Applicant Proposed Route	54.5	5	335.5
	HVDC Alternative Route 6-A	16.2	1	232.5
	HVDC Alternative Route 6-B	14.1	0	0
	HVDC Alternative Route 6-C	23.1	4	94.6
	HVDC Alternative Route 6-D	9.2	2	108.8
7	Applicant Proposed Route	42.9	25	344.6
	HVDC Alternative Route 7-A	43.2	8	314.4
	HVDC Alternative Route 7-B	8.6	3	50.4
	HVDC Alternative Route 7-C	23.8	15	160.2
	HVDC Alternative Route 7-D	6.5	9	56.2

[1]The length of the Applicant Proposed Route was not adjusted for the minor changes from the route variations developed in response to Draft EIS comments.

Floodplain areas that would be within the representative ROWs of the AC collection system alternative routes and within converter station and AC interconnection siting areas are shown in Table 2. Of the 13 alternative routes in the AC collection system in Region 1 in the Oklahoma and Texas panhandles, two do not have floodplains (SE-2 and SW-1). The other routes have only one or two crossings with a relative small acreage that would be affected. Most of the floodplain acreage along the AC collection system would likely be avoided by spanning the floodplain. However, some construction activity and possible tree clearing or trimming would likely be unavoidable in some floodplains in the AC collection system area.

No floodplains are located in either the Oklahoma or Tennessee Converter Station and AC Interconnection Siting Areas (Table 2). The Arkansas Converter Station and AC Interconnection Siting Area has one floodplain that represents about 7 percent of the area.

Table 2:
Summary of floodplains in the AC Collection System and the AC/DC Converter Station Siting Areas

Region	AC Collection System	Segment Length (miles)	Number of Floodplains	Floodplain Acreage in 200-Foot-Wide ROW
1	Route E-1	29.0	1	1.0
	Route E-2	40.0	2	54.6
	Route E-3	40.1	2	6.8
	Route NE-1	29.9	2	19.1
	Route NE-2	26.2	1	24.3
	Route NW-1	51.9	2	32.8
	Route NW-2	56.0	1	19.1
	Route SE-1	40.2	2	54.6
	Route SE-2	13.3	0	0
	Route SE-3	49.0	2	54.6
	Route SW-1	13.3	0	0
	Route SW-2	37.0	2	16.6
	Route W-1	20.8	2	15.2
Region	AC/DC Converter Stations	Siting Area	Number of Floodplains	Floodplain Acreage
1	Oklahoma Converter Station and AC Interconnection Siting Area	1497.1	0	0
5	Arkansas Converter Station and AC Interconnection Siting Area	1021.3	1	73
7	Tennessee Converter Station and AC Interconnection Siting Area	218.3	0	0

DOE also considered several potential alternatives to the proposed Project, but eliminated them from detailed analysis for various reasons. Project alternatives considered-but-eliminated from consideration included alternative transmission line routes, an underground HVDC transmission line, local energy generation and distribution, and energy conservation programs. More information on these alternatives and the basis for their elimination from detailed analysis is presented in Section 2.4.4 of the EIS.

6. Conformance with Floodplain Protection

As proposed, the Project would conform to applicable state and local floodplain protection standards. All structures and facilities would be designed to be consistent with the intent of the standards and criteria of the National Flood Insurance Program (44 CFR Part 60, Criteria for Land Management and Use).

The Project construction activities that could affect floodplains include vegetation clearing; placement of long-term structures such as AC and HVDC transmission structures, converter station foundations, and permanent above-grade roads within a floodplain; and driving heavy equipment within a floodplain resulting in soil compaction. Transmission line structures would not prohibit the flow of water within floodplains, because water can flow around structure foundations, but the foundations could represent small areas of impervious surfaces. Transmission structure foundation dimensions are shown in Chapter 2 in Table 2.1-4. Placing converter stations within a floodplain would increase impermeable surfaces within the floodplain and reduce water absorption, and could change the grade of the floodplain by limiting the ability of water to spread during high-flow events. The addition of new access roads within a floodplain could result in vegetation clearing, soil compaction, an increase in impervious surfaces, and reduction in water absorption. Access roads could also change the gradient of the floodplain by limiting the ability of water to spread during high-flow events.

The Project's impacts on floodplains during operations and maintenance would be associated with access roads. It is anticipated that unpaved or two-track access would be used for maintenance, which would result in long-term but low intensity impact in the form of soil compaction in floodplains.

7. Steps to Avoid, Minimize, and Offset Potential for Adverse Effects

The first measure to be taken to minimize potential adverse effects to floodplains would be avoidance. Placement of transmission line structures, converter stations, and access roads within 100-year floodplains would be avoided as practicable. The floodplain areas identified in Section 3 of this Statement of Findings are those lying within a 200-foot-wide representative ROW for transmission lines and a siting area for each converter station. When the Applicant lays out the final transmission line route and converter station for design, there will be some flexibility with regard to the location of structures within the ROW or siting areas. Although there will be multiple and, possibly, competing criteria for determining exact structure locations, avoidance of floodplains as practicable would be one of the criteria. In the case of siting the transmission line, the span between structures would also provide some flexibility for avoiding floodplains. That is, in some areas it would be reasonable to minimize the number of structures in a floodplain by controlling the spans or to place the structures outside the floodplain, which would then be spanned by the transmission line.

The Applicant has also developed and committed to implement a comprehensive list of environmental protection measures (EPMs) to minimize environmental impacts of the proposed Project (Appendix F of the Plains & Eastern EIS). EPMs that would reduce the potential for adverse effects to floodplains are as follows (with the EPM designation):

- (GE-3) Clean Line will minimize clearing vegetation within the ROW, consistent with a Transmission Vegetation Management Plan (TVMP) filed with the North American Electric Reliability Corporation, and applicable federal, state, and local regulations.
- (GE-6) Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-27) Clean Line will minimize compaction of soils and rutting through appropriate use of construction equipment (e.g., low ground pressure equipment and temporary equipment mats).

- (W-2) Clean Line will identify, avoid, and/or minimize adverse effects to wetlands and waterbodies. Clean Line will not place structure foundations within the Ordinary High Water Mark (OHWM) of Waters of the United States (WoUS).
- (W-9) Clean Line will design converter station sites to avoid adverse changes to the base flood elevation within the 100-year floodplain.
- (W-10) Clean Line will minimize fill for access roads and structure foundations within 100-year floodplains to avoid adverse changes to the base flood elevation.

DOE, in consultation with the USACE, has identified the following best management practices (BMPs) to avoid or minimize impacts on wetlands, floodplains, and riparian areas:

- In addition to protection of intermittent and perennial streams, ephemeral streams would also be included in the Applicant's streamside management zones. This BMP would add to EPM W-3.
- In addition to minimization of clearing vegetation within the ROW (GE-3), it is recommended that where tree removal is necessary in the ROW, this removal should be accomplished at ground level leaving root wads in place to aid in the stabilization of soils.
- Limit, to the extent practicable, the amount of vegetation removed along streambanks and minimizing the disruption of natural drainage patterns.
- All permanent and temporary crossings of waterbodies would be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of aquatic species. The crossings would also be constructed to withstand expected high flows. The crossings would not restrict or impede the passage of normal or high flows.
- Excavated trenches that are to be backfilled should separate the upper 12 inches of topsoil from the rest of the excavated material. The topsoil should be used as the final backfill.

References

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42 USC § 15801 *et seq*. "Energy Policy Act of 2005" (Pub. L. 109-58). <http://www.law.cornell.edu/uscode/text/42/chapter-149>.

Executive Order 11988. "Floodplain Management." May 24, 1977 (42 FR 26971). <http://www.archives.gov/federal-register/codification/executive-order/11988.html>.

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APPENDIX O

BIOLOGICAL ASSESSMENT AND ADDENDUM

DISCLAIMER: Upon consultation with the U.S. Fish and Wildlife Service, redactions have been made to the publicly released document to remove information related to potential species habitats and occurrence in order to protect sensitive species from disturbance.

This document was originally marked as "Pre-decisional; Not for Public Distribution" based on the sensitivity of material included in the document and the pre-decisional nature of the consultation at the time it was provided to the U.S. Fish and Wildlife Service. The Department of Energy has concluded that, with the omission of sensitive material, public distribution of this document is appropriate.

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Final Biological Assessment

for the

PLAINS & EASTERN CLEAN LINE

March 27, 2015

Pre-Decisional; Not for Public Distribution

Prepared for:

CLEAN LINE ENERGY PARTNERS

Prepared by:

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Global Environmental Specialists

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Acronyms and Abbreviations

ºF	degrees Fahrenheit
ABB	American burying beetle
AC	alternating current
ANHC	Arkansas Natural Heritage Commission
AHTD	Arkansas Highway and Transportation Department
APLIC	Avian Power Line Interaction Committee
APP	Avian Protection Plan
ARS	Arkansas River Shiner
BA	Biological Assessment
CHAT	Critical Habitat Assessment Tool
CI	confidence interval
Clean Line	Clean Line Energy Partners LLC of Houston, Texas, parent company of Plains and Eastern Clean Line LLC and Plains and Eastern Clean Line Oklahoma LLC
CRP	Conservation Reserve Program
DC	direct current
DOE	(United States) Department of Energy
EOR	estimated occupied range
EPM	Environmental Protection Measure
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FVW	Fish, Vegetation and Wildlife
GE	General
GEO	Soils
GIS	geographic information system
HVDC	high-voltage direct current
ILT	interior least tern
kV	kilovolt
LEPC	lesser prairie-chicken
LU	land use
MW	megawatt(s)
NEPA	National Environmental Policy Act

NERC	North American Electric Reliability Corporation
NOI	Notice of Intent
NRCS	Natural Resources Conservation Service
NYSDEC	New York State Department of Environmental Conservation
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
ODOT	Oklahoma Department of Transportation
ODWC	Oklahoma Department of Wildlife Conservation
OG&E	Oklahoma Gas & Electric
OHWM	Ordinary High Water Mark
O&M	operation and maintenance
PLJV	Playa Lakes Joint Venture
Project, the	Plains & Eastern Clean Line transmission project
ROW	right-of-way
SH	State Highway
Southwestern	Southwestern Power Administration
SPCC	Spill Prevention, Control, and Countermeasures
S.R.	State Route
SWPPP	Storm Water Pollution Prevention Plan
TVA	Tennessee Valley Authority
TVMP	Transmission Vegetation Management Plan
US	United States Highway
USACE	U.S. Army Corps of Engineers
U.S.C.	U.S. Code
USFWS	United States Fish and Wildlife Service
W	waters, wetlands, and floodplains
WAFWA	Western Association of Fish and Wildlife Agencies
WDZ	wind development zone
WMA	wildlife management area
WNS	white-nose syndrome

Executive Summary

The U.S. Department of Energy (DOE) is considering whether to participate, acting through the Southwestern Power Administration (Southwestern), in the Plains and Eastern Clean Line transmission project (the Project) pursuant to authority granted under Section 1222(b) of the Energy Policy Act of 2005. Clean Line Energy Partners LLC of Houston, Texas, (parent company of Plains and Eastern Clean Line LLC and Plains and Eastern Clean Line Oklahoma LLC, which are two entities collectively referred to herein as "Clean Line") proposes to construct, own, and operate the Project. This Project would deliver renewable energy generated in the Oklahoma Panhandle to the Mid-South and southeastern United States via an interconnection with Tennessee Valley Authority. Clean Line is also considering developing a 500-megawatt (MW) interconnection to the Midcontinent Independent System Operator in Arkansas.

The Project's major components include two alternating current/direct current converter stations and an intermediate converter station, an overhead ± 600kV electric transmission line; four to six alternating current collection transmission lines; use of existing public and private roads and construction of new, private access roads; temporary construction areas; and interconnections to existing transmission systems.

The Endangered Species Act of 1973 (ESA or Act) directs all federal agencies to consult with the United States Fish and Wildlife Service (USFWS) when a proposed agency action "may affect" a species that is listed pursuant to the Act, or its designated or proposed critical habitat. Accordingly, federal agencies are required to prepare a Biological Assessment (BA) to analyze the potential effects of the proposed Project. DOE has assumed responsibility as the lead agency for purposes of fulfilling the consultation requirement with respect to potential participation in the Project under Section 1222(b) of the Energy Policy Act of 2005. This BA has been prepared for the purpose of supporting consultation with USFWS regarding the potential effects of the Project on listed species and designated critical habitat.

The BA evaluates the potential for this Project to impact 30 species of plants and wildlife and designated or proposed critical habitats. The BA reviews all Project components and applicable Environmental Protection Measures, as set forth in the May 2014 Project Description provided by Clean Line to DOE, and considers the potential direct and indirect impacts of the construction, operation and decommissioning of the Project. Potential impacts on all species (or, as appropriate, on designated and proposed critical habitats for these species) are detailed, and effects determinations are provided. As further described below, an evaluation was made as to whether the Project may affect listed species and, where a "may affect" determination was made, whether the Project was "not likely to adversely affect" or "likely to adversely affect" such listed species. Consistent with Section 7, the ESA implementing regulations and USFWS guidance, the no effect/not likely to adversely affect/likely to adversely affect determinations were based on the best scientific and commercial data available. Where a "not likely to adversely affect" determination was made, a conclusion was reached that the potential impacts would not result in "take" as defined under the ESA and the USFWS implementing regulations and such potential impacts are expected to be insignificant or discountable when considering the Project design as well as the implementation of Environmental Protection Measures and, as applicable, species-specific measures identified within the BA. Conversely, a likely to adversely affect determination was made in any instance where the potential impacts to the species, after consideration of Environmental Protection Measures and applicable species-specific measures identified in the BA, were more than insignificant or discountable. Thus, even to the extent that potential impacts would not result in "take" as defined under the ESA and USFWS implementing regulations, a "likely to adversely affect" determination was made if such potential impacts were more than insignificant or discountable.

Based on the BA, DOE has reached the following conclusions regarding the potential impacts of the Project on threatened, endangered, and candidate species as well as designated critical habitat:

> The Project **is likely to adversely affect** 6 species (*American burying beetle, gray bat, Indiana bat, northern long-eared bat*, *Ozark big-eared bat,* and *lesser prairie-chicken*) and a formal consultation on such species should be initiated with the USFWS.

The Project would have **no effect** on 5 species (*fanshell, Neosho mucket, Ozark cavefish, yellowcheek darter,* and *Florida panther*).

The Project may affect, but is **not likely to adversely affect** 19 species (*geocarpon*, *pondberry, Curtis pearlymussel, fat pocketbook, pink mucket, rabbitsfoot* [includes critical habitat], *scaleshell mussel, snuffbox, specked pocketbook, spectaclecase, Arkansas darter, Arkansas River shiner* [includes critical habitat], *pallid sturgeon, Ozark hellbender, interior least tern, piping plover, red knot* [rufa *subspecies*], *Sprague's pipit*, and *whooping crane*).

DOE requests USFWS' concurrence, in writing, with respect to the not likely to adversely affect determinations made within the BA.

1.0 Introduction

The U.S. Department of Energy (DOE) is considering whether to participate, acting through the Southwestern Power Administration (Southwestern), in the Plains and Eastern Clean Line transmission project (the Project) pursuant to authority granted under Section 1222(b) of the Energy Policy Act of 2005. Clean Line Energy Partners LLC of Houston, Texas, (parent company of Plains and Eastern Clean Line LLC and Plains and Eastern Clean Line Oklahoma LLC, which are two entities collectively referred to herein as “Clean Line”) is proposing to construct, own, and operate the Project for the purpose of delivering renewable energy generated in the Oklahoma Panhandle region to load-serving entities in the Mid-South and southeastern United States via an interconnection with Tennessee Valley Authority.

1.1 Endangered Species Act Section 7 Process

The Endangered Species Act of 1973 (16 U.S.C. 153 et seq.), as amended (ESA or Act) directs all federal agencies to consult (referred to as section 7 consultation) with the United States Fish and Wildlife Service (USFWS) or National Marine Fisheries Service when those agencies’ activities “may affect” a species listed pursuant to the Act, or its designated or proposed critical habitat.

The ESA requires federal agencies to prepare a Biological Assessment (BA) to analyze the potential effects of the proposed Project on species designated as threatened or endangered as well as any designated critical habitat that may be present in the area potentially affected by the Project. Further, the federal agency also may analyze the potential effects of the Project on candidate species and/or proposed critical habitat.

Pursuant to 50 C.F.R. § 402.07, where a particular action may involve more than one agency, the consultation requirement can be fulfilled through a lead agency. Further, a federal agency may designate a non-federal representative to conduct informal consultation and prepare a Biological Assessment in accordance with 50 C.F.R. § 402.08. DOE has assumed responsibility as lead agency for fulfillment of the consultation requirement under Section 7(a)(2). Further, DOE has designated Clean Line as a non-federal representative with responsibility for preparing the BA. Accordingly, the BA has been prepared to support consultation between DOE, Southwestern and the USFWS on the potential effects of the Project.

The focus of the Section 7 consultation is to examine the potential effects of the action. Accordingly, the BA does not distinguish between those actions that may be carried out by Clean Line as compared to actions that may be carried out by DOE or Southwestern within the context of any decision to participate under Section 1222(b). Rather, the potential effects of the actions evaluated in this BA are neutral with respect to the nature of any final agreement between Clean Line, DOE and/or Southwestern on potential participation under Section 1222(b). Thus, the purpose of referring to the Project and Clean Line actions, in the BA, is to ensure the examination of the potential effects of the construction, operation and maintenance of the Project, as a whole, upon listed species and any designated critical habitat.

1.2 United States Fish and Wildlife Service Consultation History

The DOE designated Clean Line as its non-federal representative for ESA consultation pursuant to ESA Section 7. This authorized Clean Line to consult with the USFWS (under DOE’s direction) informally on the Project. The following provides a summary of Clean Line’s agency correspondence and ongoing consultation with the USFWS during development of this BA:

- March 27, 2013, USFWS Tulsa Ecological Field Office. Clean Line initiated informal consultation under Section 7(a)(2) of the ESA. The meeting was held to establish USFWS Regions 2 and 4 leads and points of contact for the Project, and to elicit information on species listed under the ESA as threatened, endangered, or candidate, and their proposed and designated critical habitats.
- May 2, 2013, Species List. In response to Clean Line's March 27, 2013, initiation of informal consultation and request for species information, the USFWS Region 2 Office provided a letter to Clean Line listing the federally listed and proposed endangered or threatened species and critical habitat for the proposed Project.
- October 29, 2013, USFWS Albuquerque Regional Office. Clean Line conducted an informal consultation meeting with USFWS Regions 2 and 4. The purpose was to discuss and provide information on the threatened and endangered species, including proposed and candidate species, to be evaluated under Section 7(a)(2) of the ESA for the Project. The meeting also served to update the USFWS on the current Project timeline. Clean Line and USFWS discussed the Master Species Information Sheets and geospatial data for each species being provided to USFWS by Clean Line and the process for USFWS review and comment.
- January 13, 2014, USFWS Albuquerque Regional Office. Clean Line conducted an informal consultation meeting with USFWS Regions 2 and 4. The purpose of the meeting was for Clean Line to obtain feedback on Master Species Information Sheets provided to the USFWS on October 29, 2013, and to discuss information concerning species survey protocols provided to Clean Line on December 31, 2013. Lastly, the meeting continued the informal discussion and information exchange regarding the threatened and endangered species, including proposed and candidate species, to be evaluated under Section 7(a)(2) of the ESA for the Project. The meeting also served to update the USFWS of the current Project timeline.
- February 18, 2014, Teleconference. Clean Line conducted an informal agency consultation via teleconference. The call included Clean Line, the DOE, Southwestern Power Administration, and USFWS Regions 2 and 4. The purpose of the call was to provide Clean Line an opportunity to obtain clarification on the plans for field surveys in 2014 to support the development of the BA for the Project. Clean Line indicated that they were revising the Master Species Information Sheets to reflect USFWS comments received January 27, 2014, and noted that Clean Line did not have any questions at this time regarding the specific USFWS comments. Clean Line representatives led a discussion concerning specific USFWS comments on surveys and survey protocols.
- February 26, 2014, Species List Request. Clean Line submitted a letter to USFWS Region 2 requesting an update to the list of federally listed and proposed endangered and threatened species and critical habitat that may occur in the counties intersected by the proposed Project.
- March 3, 2014, Clarification on Surveys and Survey Protocols. Clean Line submitted a letter to USFWS Region 2 requesting technical assistance with respect to clarification on surveys and survey protocols to inform the development of a Data Collection and Evaluation Plan to Support the BA for the Plains and Eastern Project.

- April 4, 2014, Updated Species List and Survey Clarification. The USFWS Region 2 provided Clean Line with a letter updating the list of federally listed and proposed endangered or threatened species and critical habitat for the proposed Project. The letter also provided a response to Clean Line's clarification request regarding species surveys and survey protocols.

- April 16, 2014, Plan Submittal. Clean Line provided the USFWS a Data Collection and Evaluation Plan to Support the BA for the Plains and Eastern project. This Plan called for the Project to collect and assess desktop data for all species identified by the USFWS as potentially occurring in the project area. Desktop studies would be used for species: 1) that have been locally extirpated; 2) for which a required element of their life cycle is not present, obviating the potential for their occurrence; or 3) where current data on local distribution and occurrence are available or where it has been determined that surveys would not add new information that would appreciably change effects determinations. The Plan also provided that Clean Line would conduct surveys to provide additional data necessary to inform the Biological Assessment based on the Master Species List developed in consultation with the USFWS.

- May 1, 2014, Teleconference. Clean Line conducted an informal agency consultation via teleconference. The call included Clean Line, the DOE, and USFWS Regions 2 and 4. The call provided the USFWS an opportunity to discuss ESA issues and Clean Line's Data Collection and Evaluation Plan to Support the BA for the Project, and to establish data needs for future effects determinations. DOE, Clean Line, and USFWS discussed potential survey methodologies for several species as outlined in the Data Collection and Evaluation Plan.

- July 3, 2014, Teleconference. Clean Line Energy representatives John Kuba and Jason Thomas, along with David Plumpton (Ecology and Environment, Inc.), and American burying beetle (ABB) expert Amy Smith (SEARCH), held a conference call with USFWS Tulsa Ecological Services Field Office representatives Daniel Fenner and Anita Barstow to present the results of the ABB desktop habitat assessment and to discuss next steps associated with the Project, including the need for habitat surveys. John Kuba provided a brief update on the status of the Biological Evaluation/Biological Assessment along with a review of the ABB efforts performed to date, including a discussion of the data collection and evaluation efforts for ABB.

- October 6, 2014, Teleconference. Clean Line conducted an informal agency teleconference. The call included Clean Line and USFWS Region 2 biologists Wade Harrell, Vanessa Burge, and Christine Willis. The call provided the USFWS an opportunity to discuss Clean Line's Whooping Crane Habitat Suitability Modeling to support the BA for the Project.

- November 25, 2014, Transmittal of draft BA. DOE submitted the draft BA and Appendices to the USFWS for informal review.

- December 4, 2014, Teleconference. Clean Line and DOE conducted an informal teleconference with the USFWS Region 2 and Region 4 biologists to discuss the November 25, 2014 transmittal of the draft BA for review by the USFWS. The purpose of the call was to provide a summary of the draft BA framework and to address any initial questions from the USFWS.

- January 16, 2015 & January 21, 2015, USFWS Comments. USFWS provided written comments on the draft BA. Comments included general remarks and questions regarding the analysis of "take" as part of the not likely to adversely affect/likely to adversely affect determination as well as species-specific comments regarding the Arkansas darter, bats, lesser prairie-chicken, red knot, Sprague's pipit and Ozark cavefish.

- January 22, 2015, USFWS Albuquerque Regional Office. DOE and Clean Line conducted an informal agency consultation meeting with the USFWS Region 2 and Region 4 representatives to discuss comments provided by the USFWS on the draft BA. Clean Line and DOE provided initial responses to comments and facilitated further discussion with the USFWS to inform revisions to the draft BA prior to initiating formal consultation.

- January 26, 2015, Teleconference. Clean Line conducted an informal teleconference with Tommy Inebnit, USFWS Arkansas Ecological Services Field Office, to follow up on several questions that were not addressed during the January 22 meeting in Albuquerque. Clean Line and DOE responded to comments on the draft BA and provided further information regarding the Action Areas defined for each of the four bat species summarized in the draft BA.

- January 30, 2015, USFWS Comments. USFWS provided additional written comments and further clarification of comments provided on January 16th and 21st, 2015. Comments focused on further clarifications regarding treatment of "take" and evaluation of insignificant and discountable effects. Specific comments followed, involving the interior least tern, whooping crane, and bat species.

- March 10, 2015, Species List Confirmation. USFWS Region 2 confirmed with Clean Line that the list of 30 species previously identified for inclusion in the BA was accurate, and that no new species have been listed or are proposed for listing within the Action Area.

2.0 Proposed Action

2.1 Project Background

Clean Line is proposing to construct, own, and operate the Project, which would deliver renewable energy generated in the Oklahoma Panhandle region to load-serving entities in the Mid-South and southeastern United States via an interconnection with Tennessee Valley Authority (TVA). Clean Line is also considering developing a 500-megawatt (MW) interconnection to the Midcontinent Independent System Operator in Arkansas.

The Project is an overhead ± 600-kilovolt (kV) high-voltage direct current (HVDC) electric transmission system and associated facilities with the capacity to deliver approximately 3,500MW. The ± 600kV HVDC transmission line will transmit energy from the Texas County Converter Station in Oklahoma, to the Shelby Converter Station in Tennessee.

A summary of the Project's major facilities and improvements follows. An overview of Project components is shown in Figure 2.1-1, "Project Overview."

- **Converter Stations:** Two alternating current (AC)/direct current (DC) converter stations, one at each end of the transmission line. Clean Line proposes to locate the converter stations in Texas County, Oklahoma, and Shelby County, Tennessee. Clean Line is studying an intermediate converter station in Pope or Conway County, Arkansas. Each converter station will encompass approximately 45 to 60 acres. At each converter station, 345kV AC transmission lines will connect to the existing grid. The Oklahoma AC Interconnection will traverse 2.7 miles, while the Tennessee AC Interconnection will potentially traverse 0.2 miles, and the Arkansas AC Interconnection will potentially traverse 6.0 miles.
- **HVDC Transmission Facilities:** A ± 600kV HVDC overhead electric transmission line with the capacity to deliver approximately 3,500MW to the TVA and 500MW to an intermediate substation. This BA applies specifically to Clean Line's Proposed Route. The final location of the ROW for the HVDC transmission line will be determined following engineering design and ROW acquisition activities. Clean Line's Proposed Route crosses the counties listed in Table 1-1, "Location of Project Facilities by State and County," in the Draft Project Description (Clean Line 2014a). The HVDC transmission line will traverse approximately 721.5 miles, with approximately 427.9 miles in Oklahoma, 277.2 miles in Arkansas, and 16.4 miles in Tennessee. Components of the HVDC transmission facilities include:
  - Tubular and lattice steel structures used to support the transmission line;
  - Communications/control and protection facilities (optical ground wire and fiber optic regeneration sites); and
  - Right-of-way (ROW) easements for the transmission line, with a typical width of approximately 150 to 200 feet.
- **AC Collection System Facilities:** To facilitate efficient interconnection of wind generation, four to six AC collection transmission lines of up to 345kV from the Texas County Converter Station to points in the Oklahoma Panhandle region. This system will consist of four to six lines that may traverse up to 446.9 miles throughout Texas, Beaver, and Cimarron Counties, Oklahoma, and Hansford, Ochiltree, and Sherman Counties, Texas. Components of the AC facilities include:

- Tubular or lattice steel structures used to support the transmission line;
- Communications facilities;
- Control and protection facilities; and
- ROW easements for the transmission line with a typical width of approximately 150 to 200 feet.

- **Access Roads:** To access the Project facilities and work areas during the construction and operation phases, Clean Line will use existing public and private roads and construct new, private access roads as needed.
- **Temporary Construction Areas:** Temporary construction areas will include multi-use construction yards, fly yards, tensioning and pulling sites, and wire-splicing sites.
- **Interconnections to Existing Transmission Systems.** The AC interconnections and related upgrades would involve construction of transmission lines and upgrades to existing equipment to facilitate injection of additional power transmitted by the Project.

2.1.1 Project Routing Summary

This section provides an overview of the process Clean Line used to identify the proposed converter station siting areas, the HVDC transmission line route, and AC Collection System alternative routes for the Project.

Clean Line evaluated siting for the converter stations and the HVDC transmission line portion of the Project using an iterative process. Clean Line began with a broad Study Area to which it applied progressively more detailed and restrictive siting criteria, resulting in identification of the proposed converter station siting areas and the Network of Potential Routes published in the Notice of Intent. Clean Line considered and used guidelines and criteria consistent with transmission line siting principles used by federal entities. The Project Siting Narrative described this process (Clean Line 2013a).

Following the close of the National Environmental Policy Act scoping period, Clean Line considered the scoping comments received by the DOE during the Environmental Impact Statement scoping period (DOE 2013b) and the stakeholder comments received by Clean Line during their outreach efforts, and continued the iterative route identification process resulting in Clean Line's converter station siting areas and Proposed Route. The Tier IV Routing Study described this process (Clean Line 2013b).

Clean Line used a similar process as described above to site the AC Collection System alternative routes with additional consideration and evaluation of wind resources in the Oklahoma Panhandle and northern Texas Panhandle and areas with a high potential for future development of wind generation. Clean Line studied the wind and land use characteristics within approximately 40 miles of the Texas County Converter Station Siting Area. Clean Line's studies focused on identifying several large areas with excellent wind resources and potentially suitable land uses for land-based, commercial-scale wind development (i.e., wind development zones [WDZs]). Clean Line then identified potential corridors to connect the Texas County Converter Station Siting Area to the WDZs. All potential corridors begin at the Texas County Converter Station Siting Area and end within a WDZ. The process Clean Line used to identify potential routes for the AC Collection System transmission lines for the Project is described in the AC Collection System Routing Study (Clean Line 2014b).

Throughout the route selection process, Clean Line sought to parallel existing linear infrastructure along which transmission line development would be considered generally compatible. Examples of linear infrastructure considered included federal, state, and county roads; electric transmission lines; railroads; and pipelines. Clean Line also considered various resource sensitivities that may limit or conflict with transmission line development and avoided these sensitivities to the extent practicable. Examples of sensitivities considered included areas restricted by regulations or covenants/easements limiting transmission line development, pre-existing incompatible land uses, or other locations containing natural or human-made resources that are subject to protection and/or that are difficult to mitigate (e.g., threatened and endangered species habitat, residential and commercial development, cultural and historic resources).

Thus, the process for developing Clean Line's converter stations, Proposed Route, and AC Collection System transmission lines was designed to minimize conflicts with existing resources, developed areas, and existing incompatible infrastructure; to maximize opportunities for paralleling existing compatible infrastructure; and to take into consideration land use and other factors affecting route identification. To accomplish this, Clean Line, in consultation with the DOE, developed General Guidelines used during the siting of the converter stations, Clean Line's Proposed Route, and the AC Collection System transmission lines. The General Guidelines (Clean Line 2013b and 2014b) included the following:

- Use existing linear corridors to the extent practicable;
- Use areas with land uses/land cover that are consistent or compatible with linear utility uses, such as existing utility corridors and open lands, to the extent practicable;
- Avoid existing residences;
- Avoid nonresidential structures, including barns, garages, and commercial buildings;
- Minimize interference with the use and operation of existing schools, known places of worship, and existing facilities used for cultural, historical, and recreational purposes;
- Avoid cemeteries or known burial places;
- Minimize adverse effects on economic activities (e.g., impacts on existing residences, businesses and developed areas);
- Minimize crossing of designated public resource lands, including, but not limited to, national and state forests and parks, large camps and other recreation lands, designated battlefields or other designated historic resources and sites, and state-owned wildlife management areas (WMAs);
- Minimize crossings of tribal trust lands and allotments;
- Minimize the number and length of crossings of large lakes, major rivers, large wetland complexes, or other sensitive water resources;
- Minimize adverse effects on protected species habitat and on other identified sensitive natural resources (e.g., forested areas, native prairies, and other areas as identified by Natural Heritage Commissions);
- Minimize visibility of transmission lines from residential areas and visually sensitive public locations (e.g., public parks, scenic routes or trails, and designated Wild and Scenic Rivers);
- Avoid areas of past environmental contamination to the extent practicable; and
- Minimize route length, circuity, special design requirements, and impractical construction requirements.

2.2 Construction

2.2.1 Land Requirements

During construction and operation, various land uses will be traversed, including, but not limited to: open water, developed land (industrial, residential), barren land, deciduous forest, evergreen forest, mixed forest, shrub/scrub, grassland/herbaceous, pasture/hay, cultivated crops, woody wetlands, and emergent herbaceous wetlands, as well as privately and publicly owned lands. Public land use in the Analysis Area includes WMAs, national forests, National Wildlife Refuges (NWRs), conservation easements, scenic highways, and wild and scenic rivers. The land cover type and public land uses within the representative ROW for each HVDC region, converter station siting area, and the AC siting area are discussed further in Section 4, "Existing Environmental Conditions."

2.2.2 Converter Stations

The construction of a converter station typically includes:

- Land surveying and staking;
- Pre-construction surveys for biological and cultural resources
- Clearing and grubbing, grading, and construction of all-weather access roads;
- Fencing;
- Compaction and foundation installation;
- Installation of underground electrical raceways and grounds;
- Steel-structure erection and area lighting;
- Installation of insulators, bus bar, and high-voltage equipment;
- Installation of Control and protection equipment;
- Placement of final crushed-rock surface; and
- Testing and electrical energization.

Clean Line will begin the construction of a typical converter station with survey work, geotechnical sample drillings, and soil resistivity measurements that will be used in the final design phases of the station. Once the near-final design of the station has been completed, a civil contractor will mobilize to perform site-development work, including grubbing and reshaping the general grade to form a relatively flat (one percent slope maximum) working surface. This effort also will include the construction of all-weather access roads. Clean Line will erect an 8-foot-tall chain-link fence around the perimeter of the station to prevent unauthorized personnel from accessing the construction and staging areas. The perimeter fence will be a permanent safety feature to prevent the public from accessing the station. Clean Line will compact the excavated and fill areas to the required densities to allow structural foundation installations. Following the foundation installation, underground electrical raceways and copper ground-grid installation will take place, followed by steel-structure erection and area lighting. The steel-structure erection will overlap the installation of the insulators and bus bar, as well as the installation of the various high-voltage apparatus (typical of an electrical substation). The installation of the high-voltage transformers will require special, high-capacity cranes and crews (as recommended by the manufacturer) to be mobilized for the unloading, setting-into-place, and final assembly of the transformers.

While the abovementioned activities are taking place, Clean Line will construct, equip, and wire the enclosure that contains the control and protection equipment for the station. Clean Line will place a final crushed-rock surfacing on the subgrade to make a stable driving and access platform for the maintenance of the equipment. After Clean Line has installed the equipment, testing of the various systems will take place, followed by electrical energization of the facility. Clean Line will generally time the energization of the facility to take place with the completion of the transmission line work and other required facilities.

Some of the existing AC transmission lines proximate to the existing Shelby Substation may be relocated to provide adequate space for safe construction of the Shelby Converter Station.

Table 3-1, "Typical HVDC Converter Station Construction, Estimated Personnel, and Equipment," in the Draft Project Description (Clean Line 2014a) provides the typical number of workers and type of equipment Clean Line expects to use to construct a converter station.

2.2.3 HVDC Transmission Line and AC Transmission Line

Construction activities for the HVDC and AC transmission lines will typically include the following activities:

- Preparation of multi-use construction yards;
- Pre-construction surveys for biological and cultural resources
- Preparation of the ROW;
- Clearing and grading;
- Foundation excavation and installation;
- Structure assembly and erection;
- Conductor stringing;
- Grounding; and
- Cleanup and site restoration.

Figure 2-29, "HVDC Transmission Line Construction Sequence," in the Draft Project Description (Clean Line 2014a) illustrates these activities and the typical transmission construction sequence.

The estimated overall duration of construction is approximately 36 to 42 months for the entire Project, including the time from initiation of clearing and grading through cleanup and restoration. However, Clean Line expects the duration of construction for a segment of either an HVDC or AC transmission line to be approximately 24 months from mobilization to restoration. Clean Line will divide the Project into several segments with multiple contractors working concurrently on different portions of the route to accomplish this schedule and to maintain effective management of construction operations and allocation of resources. For the purposes of estimating resource needs, Clean Line assumes that the HVDC line will be constructed in five segments of approximately 140 miles in length. Clean Line expects to construct the AC collection lines in four to six segments up to 40 miles in length. Construction of the AC lines requires crew sizes and personnel similar to the HVDC line segments due to construction sequencing. Clean Line will task specific crews to complete each of the individual activities required for construction along each segment in assembly line fashion (see Figure 2-29, "HVDC Transmission Line Construction Sequence" in the Draft Project Description [Clean Line 2014a]). Construction may be active on any or all segments at any given time and activities may correspond with other segments or be staggered.

Due to the assembly line nature of transmission line construction, the activities at any one location along a segment would be less than 24 months. The actual construction duration will be dependent on a number of factors such as weather, land use, availability of labor, and progress of the individual work crews. The construction personnel peak in any 140-mile segment of the route will be approximately 290 workers. Estimated maximum personnel at any given time required for all tasks is 290 for an HVDC segment or AC Collection System segment. This will occur when the tower setting operations begin, while several other operations are occurring at the same time, which includes ROW clearing, construction of access roads and structure pads, foundation installation, hauling materials, and assembling and erecting structures.

Clean Line will stage construction on each segment from multi-use construction yards located at regular intervals (approximately every 25 miles) along the route. Based on a preliminary desktop review of labor resources, Clean Line anticipates that approximately one-half of the work force could be recruited from within 200 miles of the Project. Construction access will occur at several locations along the transmission line route, resulting in dispersed construction activity and associated traffic.

Project-wide, the workforce will reach a peak of approximately 1,700 workers. The average workforce across the Project will be approximately 965 people. Table 3-2, "Typical HVDC and AC Transmission Line Construction, Estimated Personnel, and Equipment," in the Draft Project Description (Clean Line 2014a) provides the number of workers and type of equipment Clean Line expects to use to construct the transmission line in a typical 140-mile segment.

Clean Line will use temporary construction areas to support construction. Temporary multi-use construction yards and fly yards are used for staging construction personnel and equipment, and for storage of materials to support construction activities. Typically, temporary construction areas will be outside the ROW. These areas will be sited at fairly regular intervals and at convenient distances from the Project facilities being constructed. Clean Line would use these areas only as long as the construction crews need them during construction of the Project. Clean Line will identify locations for these areas during the detailed engineering design of the Project and during landowner negotiations; however, Clean Line will employ certain preferred site-selection criteria, as described below.

To the extent practicable, Clean Line will employ site-selection criteria to determine preferred locations, with exceptions noted below. The site-selection criteria for both temporary multi-use construction yards and fly yards are as follows:

- Preferred sites will be on previously disturbed, privately owned parcels (e.g., vacant industrial yards, commercial lots) or on other such suitable parcels.
- Sites will be located in a manner to minimize conflict with nearby and adjacent land uses.
- Sites will have good access to public roads.
- Sites will be relatively flat.
- Sites will be selected for their relative ease of restoration; preferred sites are those that can be restored more easily to their original condition.

The approximate number and typical dimensions for temporary construction areas are summarized in Table 3-3, "Temporary Construction Areas," in the Draft Project Description (Clean Line 2014a).

2.2.4 Access Roads

Clean Line will use existing highways, local public roads, and existing local private roads to the extent practicable. Clean Line will also repair or improve certain private roads to improve access for heavy equipment. Where existing roads do not provide sufficient or safe access and as local conditions allow, Clean Line will use a range of access road options, such as overland travel or building new roads.

During construction, the size and weight of the heavy equipment typically dictates the minimum road dimensions. For example, heavy equipment during construction will typically include a lowboy equipment hauling truck, flatbed steel hauling truck, or truck-mounted aerial lift crane. Commercial concrete mixing trucks will typically generate the heaviest axle loads and often dictate certain structural requirements. Partial concrete loads may reduce weight where weight restrictions exist. To accommodate this construction equipment, project specifications for roads require a 14-foot-wide travel surface on straight sections and 16- to 20-foot-wide travel surface for horizontal curves.

Existing farm roads and unimproved two-track roads often suffice for both construction and operational access needs without significant upgrades, provided there is adequate horizontal clearance, level terrain, and firm native soil to support overland travel. Some grading may be required to ensure safe vehicle passage or during restoration.

Different types of construction activities are required with different terrain. In areas of gentle terrain, and where soil conditions permit, direct vehicle travel over low growth vegetation is generally preferred. In this case, Clean Line will retain existing low-growth vegetation to the extent practicable and will only remove any larger woody vegetation to allow safe vehicle passage. In areas of moderate to steep terrain, new roads will follow the natural contours of the terrain to avoid cuts on steep side slopes. In areas of rolling to hilly terrain, a wider disturbance area will be required to account for cuts and fills and surface drainage. In steep or mountainous terrain, the disturbance width may exceed 50 feet depending on soil conditions. Table 2-6, "Access Roads Facility Dimensions and Land Requirements," in the Draft Project Description (Clean Line 2014a) includes a description of existing roads with no improvements; however, Clean Line will use existing public roads during construction and operation of the Project to the extent practicable, and has not included estimates for the number of miles of existing roads with no improvements that may be used by the Project. Table 2-7, "Estimated Road Miles by Road Type for HVDC Transmission Line," and Table 2-8, "Estimated Access Road Miles by Road Type for AC Transmission Lines," in the Draft Project Description (Clean Line 2014a) contain the estimated access road miles by road type for access roads associated with HVDC and AC transmission lines and fiber optic regeneration sites.

2.2.5 Interconnections

The AC interconnections and related upgrades would involve construction of transmission lines and upgrades to existing equipment to facilitate injection of additional power transmitted by the Project. All construction methods described for AC transmission lines are the same as those expected for AC interconnection lines.

Construction of upgrades is anticipated as follows:

- Based on the analysis completed to date, Clean Line expects that a new substation would be necessary to accommodate the interconnection due to space constraints at the existing Hitchland 345kV substation. To alleviate these space constraints, SPS has proposed a new substation nearby, tentatively named "Optima." This new substation would be located within a few miles of the Texas County Converter Station in Texas County, Oklahoma.
- Based on TVA's final Interconnection System Impact Study, TVA would need to make substation or transmission upgrades to accommodate interconnection of the proposed Project including additional bays, breakers, switches, line relays, and interchange meters within the Shelby substation before interconnecting the Project.

- Clean Line selected the Arkansas Nuclear One – Pleasant Hill 500kV Point of Interconnection because it can accommodate a 500MW injection without additional upgrades to the surrounding transmission system. Midcontinent Independent System Operator performed a feasibility study of the request and concluded in February 2014 that no network upgrades were required to accommodate the interconnection. In Arkansas, the construction of the interconnection point along the existing Arkansas Nuclear One-Pleasant Hill 500kV AC transmission line would require a direct tap, small switchyard, or small substation. The interconnection facilities will be located within a small switching/tap station of approximately 5 acres in size; this area will be fenced and retained during operation of the Project. The construction method for a direct tap is similar to that described in Section 3.2, "HVDC and AC Transmission Line Construction," of the Draft Project Description (Clean Line 2014a) regarding structure assembly, conductor stringing, and cleanup and restoration.

2.3 Operations and Maintenance

This section describes the activities performed to operate and maintain the Project. The maintenance activities will consist of a Transmission Line Maintenance Program, a Vegetation Management Plan, and a ROW Management Program. Each of these activities are described in Section 4, "Operations and Maintenance," (O&M) of Clean Line's Draft Project Description (Clean Line 2014a).

Clean Line will develop and implement a Vegetation Management Program (Vegetation Program) that would be implemented based upon the Transmission Vegetation Management Plan (TVMP), which will be specifically developed to provide metrics, standards, activities, and support the goals of the Vegetation Program. The TVMP will comply with applicable NERC standards for vegetation management.

Projects typically rely on helicopter inspection reports, TLM working patrol reports, and contract field inspectors to identify vegetation that requires removal or trimming based on the standards and metrics of the TVMP. The vegetation management contractor accomplishes the vegetation removal or trimming to the satisfaction of the specific written procedures and subject to confirmation by an overseeing specialist. The Vegetation Management Program also calls for identification, marking, and removal of vegetation of concern consistent with the TVMP.

The Right of Way Management Program will manage the ROW to identify any encroachments on the ROW that either threaten the safe and reliable operation of the HVDC and AC transmission lines or are not compliant with any ROW easement limitations. When encroachments are identified, Clean Line will resolve them with the landowner or tenant to bring the ROW back into a state where land use activities are compatible with the overhead transmission lines.

Oversight of ROW encroachment typically occurs through helicopter inspection reports, TLM working patrol reports, and contract field inspectors as appropriate. Once identified, the ROW Specialist would inform and work with the landowner or tenant to resolve the encroachment issues. Examples of encroachments that occur after the transmission line is in place might include, for example:

- Non-permitted communication or electrical facilities in the ROW.
- Non-permitted pipelines crossing the ROW.
- Structures such as buildings, swimming pools, or grain elevators, that are not compliant with the ROW easement.
- Earth grading that significantly altered the ground elevation for agricultural or road construction activities.

2.4 Decommissioning

Decommissioning could occur at the end of the useful life and if the facility were no longer required. However, a transmission system lifetime can exceed 80 years with proper maintenance. If, at the end of the service life of the Project, and assuming that the facilities are not upgraded or otherwise kept in service, conductors, insulators, and structures could be dismantled and removed. The converter stations and regeneration stations, if not needed for other existing transmission line projects, could also be dismantled and removed. The station structures would be disassembled and either used at another station or sold for scrap. Access roads that have a sole purpose of providing maintenance crews access to the transmission lines could be decommissioned following removal of the structures and lines, or they could be decommissioned with the lines in service if they are determined to no longer be necessary. Clean Line will consult with landowners to assess whether access roads may be serving a larger purpose for landowners, at which point in time, Clean Line may elect to leave the access roads in place. A Decommissioning Plan would be developed prior to decommissioning, but due to the uncertainty of future technology and unknown future environmental requirements, any document would follow appropriate governing requirements at that time.

2.5 Environmental Protection Measures

Clean Line will plan, coordinate, and conduct each of the Project phases in a manner that protects the quality of the environment by developing and implementing all required plans and by implementing general and species-specific measures (see Section 5, "Species Evaluations"), and in compliance with applicable state and federal laws, regulations and permits related to construction, operation and decommissioning of the Project. Appendix B presents an overview of potential federal and state permits and consultation that could be required for construction of the Project.

Clean Line will develop and implement the following environmental-related plans to avoid or minimize effects to environmental resources including fish, vegetation, and wildlife, from construction, O&M, and/or decommissioning as appropriate:

- Transportation and Traffic Management Plan. This plan will describe measures designed to avoid and/or minimize adverse effects associated with the existing transportation system.
- Blasting Plan. This plan will describe measures designed to minimize adverse effects due to blasting.
- Restoration Plan. This plan will describe post-construction activities to reclaim disturbed areas.
- Spill Prevention, Control, and Countermeasures (SPCC) Plan. This plan will describe the measures designed to prevent, control, and clean up spills of hazardous materials.
- Storm Water Pollution Prevention Plan (SWPPP). This plan, consistent with federal and state regulations, will describe the practices, measures, and monitoring programs to control sedimentation, erosion, and runoff from disturbed areas.
- Transmission Vegetation Management Plan (TVMP). This plan, to be filed with the North American Electric Reliability Corporation (NERC), will describe how Clean Line will conduct work on its ROW to prevent outages due to vegetation.
- Avian Protection Plan (APP). This plan, consistent with Avian Power Line Interaction Committee (APLIC) guidelines, will describe a program of specific and comprehensive actions that, when implemented, reduce risk of avian mortality.

- Various cultural resources management planning documents, including historic properties treatment plans and unanticipated discoveries plans. These plans will set forth the process that Clean Line will use to identify, evaluate, and treat historic properties and cultural resources encountered during Project construction, O&M.
- Construction Security Plan. This plan will describe measures designed to avoid and/or minimize adverse effects associated with breaches in Project security during construction including terrorism, sabotage, vandalism, and theft. The plan will include provisions describing how the Project construction team will coordinate with state and local law enforcement agencies during construction to improve Project security and facilitate security incident response, if required.

Clean Line will develop and implement the following Environmental Protection Measures (EPMs) to avoid or minimize effects to environmental resources from construction, O&M, and/or decommissioning as appropriate. Clean Line will designate certain areas as "environmentally sensitive" and take actions to avoid and/or minimize effects on these areas. Environmentally sensitive areas may include, but would not be limited to, wetlands, certain waterbodies, or wildlife habitat.

Categories of EPMs include:

- General (GE) Measures (see Table 2.5-1, "General (GE) Environmental Protection Measures");
- Land Use (LU) Measures (see Table 2.5-2, "Land Use (LU) Environmental Protection Measures");
- Soils (GEO) and Agriculture (AG) Measures (see Table 2.5-3, "Soils (GEO) and Agriculture (AG) Environmental Protection Measures");
- Fish, Vegetation and Wildlife (FVW) Measures (see Table 2.5-4, "Fish, Vegetation and Wildlife (FVW) Environmental Protection Measures"); and
- Waters, Wetlands, and Floodplains (W) (see Table 2.5-5, "Waters, Wetlands, and Floodplains (W) Environmental Protection Measures").

Table 2.5-1
General (GE) Environmental Protection Measures

Reference Number	Measure	Applicable Phase		
		D/E	C	O&M
GE-1	Clean Line will train personnel on health, safety, and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits.	●	●	●
GE-2	Clean Line will design, construct, maintain, and operate the Project following current Avian and Power Line Interaction Committee guidelines to minimize risk of avian mortality.	●	●	●
GE-3	Clean Line will minimize clearing vegetation within the ROW, consistent with a Transmission Vegetation Management Plan filed with NERC, and applicable federal, state, and local regulations.	●	●	●
GE-4	Vegetation removed during clearing will be disposed of according to federal, state, and local regulations.		●	●
GE-5	Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.		●	●

Table 2.5-1
General (GE) Environmental Protection Measures

Reference Number	Measure	Applicable Phase D/E	Applicable Phase C	Applicable Phase O&M
GE-6	Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).		•	•
GE-7	Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.		•	•
GE-8	Access controls (e.g., cattle guards, fences, gates) will be installed, maintained, repaired, replaced, or restored as required by regulation, road authority, or as agreed to by landowner.	•	•	•
GE-9	Clean Line will avoid and/or minimize damage to drainage features and other improvements such as ditches, culverts, levees, tiles, and terraces; however, if these features or improvements are inadvertently damaged, they will be repaired and or restored.	•	•	•
GE-10	Clean Line will work with landowners to repair damage caused by construction, operation, or maintenance activities of the Project. Repairs will take place in a timely manner, weather and landowner permitting.		•	•
GE-11	Clean Line will conduct construction, operation, and maintenance activities to minimize the creation of dust. This may include measures such as limitations on equipment, speed, and/or travel routes utilized. Water, dust palliative, gravel, combinations of these, or similar control measures may be used. Clean Line will implement measures to minimize the transfer of mud onto public roads.		•	•
GE-12	Clean Line will avoid remedial structures (e.g., capped areas, monitoring equipment, or treatment wells) on contaminated sites, Superfund sites, CERCLA remediation areas, and other similar areas. Workers will use appropriate protective equipment and appropriate safe working techniques when working at or near contaminated sites.		•	•
GE-13	Emergency and spill response equipment will be kept on hand during construction.		•	•
GE-14	Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies, and groundwater wells, or as otherwise required by federal, state, or local regulations.	•	•	•
GE-15	Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.		•	•
GE-16	Where required by FAA, or in certain areas to protect aviator safety, Clean Line will mark structures and/or conductors and/or shield wires with high-visibility markers (i.e., marker balls or other FAA-approved devices).		•	•
GE-17	Clean Line will consider noise and radio/television interference in the design of bundle configurations and conductors. To minimize noise and radio/television interference, Clean Line will maintain tension on insulator assemblies and protect the conductor surface from damage during construction.	•	•	
GE-18	Clean Line will inspect the line from the ground and/or aircraft routinely. Damaged insulators or other equipment causing noise or radio/television interference will be identified and repaired or replaced.			•

Table 2.5-1
General (GE) Environmental Protection Measures

Reference Number	Measure	Applicable Phase D/E	C	O&M
GE-19	Clean Line will properly ground permanent structures (e.g., fences, gates) to reduce the potential for induced voltage and currents onto conductive objects in the ROW.	•	•	•
GE-20	Clean Line will conduct construction and scheduled maintenance activities on the facilities during daylight hours, except in rare circumstances that may include, for example, to address emergency or unsafe situations, to avoid adverse environmental effects, to minimize traffic disruptions, or to comply with regulatory or permit requirements.		•	•
GE-21	Clean Line will maintain construction equipment in good working order. Equipment and vehicles that show excessive emissions of exhaust gasses and particulates due to poor engine adjustments or other inefficient operating conditions will be repaired or adjusted.		•	•
GE-22	Clean Line will impose speed limits during construction for access roads (e.g., to reduce dust emissions, for safety reasons, and for protection of wildlife).		•	
GE-23	Clean Line will maximize the distance between stationary equipment and sensitive noise receptors consistent with engineering design criteria.		•	
GE-24	Clean Line will minimize the number and distance of travel routes for construction equipment near sensitive noise receptors.		•	
GE-25	Clean Line will turn off idling equipment when not in use.		•	•
GE-26	When needed, Clean Line will use guard structures, barriers, flaggers, and other traffic controls to minimize traffic delays and road closures.		•	
GE-27	Clean Line will minimize compaction of soils and rutting through appropriate use of construction equipment (e.g., low ground pressure equipment and temporary equipment mats).		•	•
GE-28	Hazardous materials and chemicals will be transported, stored, and disposed of according to federal, state, or local regulations or permit requirements.		•	•
GE-29	Clean Line will work with landowners and operators of active oil and gas wells, utilities, and other infrastructure to identify and verify the location of facilities and to minimize adverse impacts. Identification may include use of the One Call system and surveying of existing facilities.	•	•	•
GE-30	Clean Line will minimize the amount of time that any excavations remain open.		•	•
GE-31	Clean Line will provide sanitary toilets convenient to construction; these will be located greater than 100 feet from any stream or tributary or to any wetland. These facilities will be regularly serviced and maintained; waste disposal will be properly manifested. Employees will be notified of sanitation regulations and will be required to use sanitary facilities.		•	

Table 2.5-1 General (GE) Environmental Protection Measures				
Reference Number	Measure	Applicable Phase		
		D/E	C	O&M

Key:

C = construction

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act

D/E = design/engineering

FAA = Federal Aviation Administration

NERC = North American Electric Reliability Corporation

O&M = operations and maintenance

ROW = right-of-way

Table 2.5-2 Land Use (LU) Environmental Protection Measures				
Reference Number	Measure	Applicable Phase		
		D/E	C	O&M
LU-1	Clean Line will work with landowners and operators to ensure that access is maintained as needed to existing operations (e.g., to oil/gas wells, private lands, agricultural areas, pastures, hunting leases).	●	●	●
LU-2	Clean Line will minimize the frequency and duration of road closures.		●	●
LU-3	Clean Line will work with landowners to avoid and minimize impacts to residential landscaping.	●	●	●
LU-4	Clean Line will coordinate with landowners to site access roads and temporary work areas to avoid and/or minimize impacts to existing operations and structures.	●	●	●
LU-5	Clean Line will make reasonable efforts, consistent with design criteria, to accommodate requests from individual landowners to adjust the siting of the ROW on their properties. These adjustments may include consideration of routes along or parallel to existing divisions of land (e.g., agricultural fields and parcel boundaries) and existing compatible linear infrastructure (e.g., roads, transmission lines, and pipelines), with the intent of reducing the impact of the ROW on private properties.	●		

Key:

C = construction

D/E = design/engineering

O&M = operations and maintenance

ROW = right-of-way

Table 2.5-3
Soils (GEO) and Agriculture (AG) Environmental Protection Measures

Reference Number	Measure	Applicable Phase D/E	C	O&M
AG-1	Clean Line will avoid or minimize adverse effects to surface and subsurface irrigation and drainage systems (e.g., tiles). Clean Line will work with landowners to minimize the placement of structures in locations that would interfere with the operation of irrigation systems.	•	•	•
AG-2	Agricultural soils temporarily impacted by construction, operation, or maintenance activities will be restored to pre-activity conditions. For example, soil remediation efforts may include decompaction, recontouring, liming, tillage, fertilization, or use of other soil amendments.		•	•
AG-3	Clean Line will consult with landowners and/or tenants to identify the location and boundaries of agriculture or conservation reserve lands and to understand the criteria for maintaining the integrity of these committed lands.	•	•	•
AG-4	Clean Line will work with landowners and/or tenants to identify specialty agricultural crops or lands (e.g., certified organic crops or products that require special practices, techniques, or standards) that may require protection during construction, operation, or maintenance. Clean Line will avoid and/or minimize impacts that could jeopardize standards or certifications that support specialty croplands or farms.	•	•	•
AG-5	Clean Line will work with landowners and/or tenants to consider potential impacts to current aerial spraying or application (i.e., crop dusting) of herbicides, fungicides, pesticides, and fertilizers within or near the transmission ROW. Clean Line will avoid or minimize impacts to aerial spraying practices when routing and siting the transmission line and related infrastructure.	•	•	
AG-6	Clean Line will work with landowners to develop compensation for lost crop value caused by construction and/or maintenance.	•	•	•
GEO-1	Clean Line will stabilize slopes exposed by its activities to minimize erosion.		•	•

Key:

C = construction
D/E = design/engineering
O&M = operations and maintenance
ROW = right-of-way

Table 2.5-4
Fish, Vegetation, and Wildlife (FVW) Environmental Protection Measures

Reference Number	Measure	Applicable Phase		
		D/E	C	O&M
FVW-1	Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.	•	•	•
FVW-2	Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.		•	•
FVW-3	Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.		•	
FVW-4	If construction- and/or decommissioning-related activities occur during the migratory bird breeding season, Clean Line will work with USFWS to identify migratory species of concern and conduct pre-construction surveys for active nests for such species. Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.		•	•
FVW-5	If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.		•	•
FVW-6	Clean Line will avoid and/or minimize construction within 300 feet of caves known to be occupied by threatened or endangered species.		•	

Key:
C = construction
D/E = design/engineering
O&M = operations and maintenance
USFWS = United States Fish and Wildlife Service

Table 2.5-5
Waters, Wetlands, and Floodplains (W) Environmental Protection Measures

Reference Number	Measure	Applicable Phase		
		D/E	C	O&M
W-1	Clean Line will avoid and/or minimize construction of access roads in special interest waters.	•	•	•
W-2	Clean Line will identify, avoid, and/or minimize adverse effects to wetlands and waterbodies. Clean Line will not place structure foundations within the Ordinary High Water Mark of Waters of the United States.		•	
W-3	Clean Line will establish streamside management zones within 50 feet of both sides of intermittent and perennial streams and along margins of bodies of open water where removal of low-lying vegetation is minimized.	•	•	•
W-4	If used, Clean Line will selectively apply herbicides within streamside management zones.		•	•
W-5	Clean Line will construct access roads to minimize disruption of natural drainage patterns including perennial, intermittent, and ephemeral streams.		•	

Table 2.5-5
Waters, Wetlands, and Floodplains (W) Environmental Protection Measures

Reference Number	Measure	Applicable Phase D/E	C	O&M
W-6	Clean Line will not construct counterpoise or fiber optic cable trenches across waterbodies.	●	●	
W-7	Clean Line will locate spoil piles from foundation excavations and fiber optic cable trenches outside of streamside management zones.		●	
W-8	Dewatering will be conducted in a manner designed to prevent soil erosion (e.g., through discharge of water to vegetated areas and/or the use of flow control devices).		●	●
W-9	Clean Line will design converter station sites to avoid adverse changes to the base flood elevation within the 100-year floodplain.	●		
W-10	Clean Line will minimize fill for access roads and structure foundations within 100-year floodplains to avoid adverse changes to the base flood elevation.	●	●	●
W-11	Clean Line will locate and minimize impacts to groundwater wells and springs within the construction ROW.	●	●	●
W-12	If blasting is required within 150 feet of a spring or groundwater well, Clean Line will conduct preconstruction monitoring of yield and water quality in cooperation with the landowner. In the event of damage, Clean Line will arrange for a temporary water supply through a local supplier until a permanent solution is identified.		●	
W-13	If any groundwater wells are needed to support operational facilities, withdrawal volumes will be limited so as not to adversely affect supplies for other uses.		●	●
W-14	Clean Line will ensure that there is no off-site discharge of wastewater from temporary batch plant sites.		●	
W-15	Clean Line will seek to procure water from municipal water systems where such water supplies are within a reasonable haul distance; any other water required will be obtained through permitted sources or through supply agreements with landowners.		●	

Key:

C = construction
D/E = design/engineering
O&M = operations and maintenance
ROW = right-of-way

3.0 Action Area

The Action Area is defined as areas that are determined to be affected directly or indirectly by the federal action (50 Code of Federal Regulations §402.02). The Action Area for the Project considered not simply the area of potential direct and indirect disturbance, but also included a wider geographic area depending on the nature of the Project's impacts in relation to species. Many aspects of a species' life cycle were considered in determining the scale of an appropriate Action Area. Some of these included typical daily, seasonal, or annual home ranges; geographic distributions; migratory behaviors; mating seasons and behaviors; habitat medium (aquatic or terrestrial); and hibernation behaviors. Accordingly, species-specific Action Areas are defined and discussed in the respective summary of analysis for each species. Table 3.0-1, "Summary of Species-Specific Action Areas," provides a brief description of the species-specific Action Areas for the Project and includes a reference to the appropriate section for further discussion on species-specific Action Areas.

As a general matter, the Action Area for each species includes, at a minimum, the project disturbance footprint. The project disturbance footprint is the edge or limit of proposed ground disturbance for the Project. As an example, the project disturbance footprint of the Representative ROW for the HVDC line is a 200-foot-wide corridor. From that initial starting point, species-specific Action Areas have been developed to ensure that the potential direct and indirect effects of the Project upon the specific species and any designated critical habitat are analyzed consistent with the requirements of ESA, section 7(a)(2).

Table 3.0-1
Summary of Species-specific Action Areas

Species	ESA Status	Section	Action Area
Geocarpon *(Geocarpon minimum)*	LT	5.1	Project disturbance footprint on saline prairie soils in Franklin County, Arkansas.
Pondberry *(Lindera melissifolia)*	LE	5.2	Project disturbance footprint on sand pond habitat in Jackson and Poinsett counties, Arkansas.
American Burying Beetle *(Nicrophorus americanus)*	LE	5.3	Project disturbance footprint plus a 0.5-mile buffer where the Project traverses ABB habitat, as identified by desktop and field analyses, between Lincoln County, Oklahoma and Johnson County, Arkansas.
Curtis Pearlymussel *(Epioblasma florentina curtisii)*	LE	5.4	The project disturbance footprint is outside the range of the last known populations in Arkansas occurring in Fulton, Lawrence, and Randolph Counties.
Fanshell *(Cyprogenia stegaria)*	LE	5.5	N/A – Project is out of the species' range.
Fat Pocketbook *(Potamilus capax)*	LE	5.6	Intersection of the project disturbance footprint and the main stem of St. Francis River and White River, as well as fine grained slow moving human-made ditches, sloughs and streams (i.e., human-altered streams and tributaries, canals, etc. that support freshwater drum). To account for contamination potential, the Action Area will extend 100 feet upstream and 300 feet downstream of stream crossings in suitable habitat.

Table 3.0-1
Summary of Species-specific Action Areas

Species	ESA Status	Section	Action Area
Neosho Mucket *(Lampsilis rafinesqueana)*	E	5.7	N/A – Project is out of species' range.
Pink Mucket *(Lampsilis abrupta)*	LE	5.8	The intersection of the project disturbance footprint with the main stem of the White River and its associated perennial tributaries. To account for contamination potential, the Action Area would extend 100 feet upstream and 300 feet downstream of stream crossings in suitable habitat.
Rabbitsfoot *(Quadrula cylindrica cylindrica)*	PT	5.9	The intersection of the project disturbance footprint with the perennial streams known to have extant populations of rabbitsfoot and any potential critical habitat. To account for potential effects downstream, the Action Area will extend 100 feet upstream and 300 feet downstream of stream crossings in suitable habitat
Scaleshell Mussel *(Leptodea leptodon)*	LE	5.10	The intersection of the project disturbance footprint with the perennial streams in Crawford, Cross, Franklin, Jackson, Mississippi, Poinsett, and White Counties, Arkansas. To account for the potential of sedimentation and chemical spill contamination, the Action Area will extend 100 feet upstream and 300 feet downstream of stream crossings in suitable habitat.
Snuffbox *(Epioblasma triquetra)*	LE	5.11	The intersection of the project disturbance footprint with perennial streams in Pope, Poinsett, Cross, and Mississippi Counties, Arkansas. To account for impacts from potential of sedimentation and accidental spills of hazardous materials, the Action Area extends 100 feet upstream and 300 feet downstream of stream crossings in suitable habitat.
Speckled Pocketbook *(Lampsilis streckeri)*	LE	5.12	The intersection of the project disturbance footprint with the perennial streams in Little Red River watershed in north central Arkansas in Van Buren and Cleburne Counties. To account for contamination potential, the Action Area will extend 100 feet upstream and 300 feet downstream of stream crossings in suitable habitat.
Spectaclecase *(Cumberlandia monodonta)*	LE	5.13	The intersection of the project disturbance footprint with the perennial streams in Johnson and Franklin Counties, Arkansas (USFWS 2013a; USFWS 2013b) (see Figure 5.13-1, "Potential Presence of Spectaclecase in the Action Area"). To account for the potential of sedimentation and chemical spill contamination, the Action Area will extend 100 feet upstream and 300 feet downstream of stream crossings in suitable habitat.

Table 3.0-1
Summary of Species-specific Action Areas

Species	ESA Status	Section	Action Area
Arkansas Darter *(Etheostoma cragini)*	C	5.14	The intersection of the project disturbance footprint with any perennial or intermittent tributaries of the Cimarron River in Harper County, Oklahoma. The action area extends 100 feet upstream and 300 feet downstream of the crossings.
Arkansas River Shiner *(Notropis girardi)*	LT	5.15	The intersection of the project disturbance footprint with the Cimarron River and associated perennial and intermittent tributaries in Harper, Woodward, Major, and Garfield Counties, Oklahoma. The Action Area extends 100 feet upstream and 300 feet downstream of the crossings. In addition, at the designated critical habitat at the Cimarron River crossing in Major County, the Action Area extends 300 feet (laterally) from each side of the stream width at bankfull discharge. The USFWS includes upland areas within 300 feet of either stream bank in its definition of critical habitat for the ARS. This same standard was applied to the Action Area at the Cimarron River for assessing impacts on ARS due to Project–related disturbances in adjacent upland areas.
Ozark Cavefish *(Amblyopsis rosea)*	LT	5.16	N/A – Project is out of species' range.
Pallid Sturgeon *(Scaphirhynchus albus)*	LE	5.17	The intersection of the project disturbance footprint with the Mississippi River and all side channels, and extends 100 feet upstream and 300 feet downstream of any crossings.
Yellowcheek Darter *(Etheostoma moorei)*	LE	5.18	N/A – Project is out of species' range.
Ozark Hellbender *(Cryptobranchus alleganiensis bishop)*	LE	5.19	The intersection of the project disturbance footprint with the main stem of the White River in Jackson County, Arkansas. The Action Area extends 100 feet upstream and 300 feet downstream of the crossing to account for potential impacts from increased sediment load and turbidity, and spills of hazardous materials.
Florida Panther *(Puma concolor coryi)*	LE	5.20	N/A – Species has been extirpated from Project states.
Gray Bat *(Myotis grisescens)*	LE	5.21	The project disturbance footprint plus a 2.5-mile buffer where potentially suitable foraging habitat, maternity colonies, hibernacula, or other roosts are traversed by the Project within the gray bat's known range.
Indiana Bat *(Myotis sodalis)*	LE	5.22	The project disturbance footprint plus a 2.5 mile buffer where potentially suitable foraging habitat, maternity colonies, hibernacula, or other roosts are traversed by the Project within the Indiana bat's known range

Table 3.0-1
Summary of Species-specific Action Areas

Species	ESA Status	Section	Action Area
Northern Long-eared Bat *(Myotis septentrionalis)*	PE	5.23	The project disturbance footprint plus a 5-mile buffer where potentially suitable foraging habitat, maternity colonies, hibernacula, or other roosts are traversed by the Project within the NLEB's known range.
Ozark Big-eared Bat *(Corynorhinus townsendii ingens)*	LE	5.24	The project disturbance footprint plus a 4.5-mile buffer where potentially suitable foraging habitat, maternity colonies, hibernacula, or other roosts are traversed by the Project within the Ozark big-eared bat's known range.
Interior Least Tern *(Sternula antillarum athalassos)*	LE	5.25	The project disturbance footprint plus an additional 0.25-mile buffer applied to the entire Project
Lesser Prairie-Chicken *(Tympanuchus pallidicinctus)*	PT	5.26	The area contained within a 1,312-foot buffer of the centerlines of those segments of the HVDC and alternating current collection system route (ACCSR) alignments that lie within a 10-mile buffer of the edge of the LEPC EOR, referred to as the EOR+10.
Piping Plover *(Charadrius melodus)*	LT	5.27	The entire project disturbance footprint plus an additional 0.25-mile buffer where the Project traverses connected waterbodies of Optima Lake in Texas County, Oklahoma.
Red Knot *(Calidris canutus rufa)*	PT	5.28	The project disturbance footprint within suitable rufa red knot foraging or roosting habitats.
Sprague's Pipit *(Anthus spragueii)*	C	5.29	The entire project disturbance footprint within grassland and pasture habitats.
Whooping Crane *(Grus americana)*	LE	5.30	All suitable habitat within 1 mile of the project disturbance footprint where it traverses the 220-mile migration corridor during spring (March 25 to May 15) and fall (October 15 to December 15).

Notes:

(a) Where Action Areas have extended downstream for fish and mussel species, the Action Area has typically been established by modeling. 500 feet is arbitrary but greater than all previously identified buffers.

Key:

C = Candidate
ESA = Endangered Species Act
HVDC = high-voltage direct current
LE = Endangered
LEPC = lesser prairie-chicken
LT = Threatened
PE = Proposed Endangered
PT = Proposed Threatened
ROW = right-of-way

4.0 Existing Environmental Conditions

This section summarizes the existing conditions with the project disturbance footprint for the converter station siting areas, Clean Line's Proposed HVDC Transmission Line Route, and the AC Collection System alternatives. This information includes conditions reflecting the past and present impacts of all human actions (Federal, State, private, etc.) on the species or critical habitat and is intended to inform the environmental baseline for the species-specific analysis set forth in Section 5, "Species Evaluations."

Section 4.1, "Data Sources," summarizes the data relied upon to describe the existing environmental conditions and includes Table 4.1-1, "Summary of GIS Data Sources for Existing Environmental Conditions." All sources referenced in Table 4.1-1 are included in Section 7, "References." Section 4.2, "Existing Conditions within the Project Disturbance Footprint Action Area," describes the existing conditions within the project disturbance footprint.

4.1 Data Sources

The information set forth in this section has been compiled using a desktop analysis of geographic information system (GIS) data as well as relevant information, research, and reports that are publicly available. Sources of GIS data include federal, state, and municipal governments and non-governmental organizations. Data were obtained from official agency GIS data access websites or directly from government agencies. Some data were developed through aerial photo interpretation using the best available data at the time; the findings of an aerial reconnaissance performed by Clean Line in August 2013; verified information from stakeholder comments received by Clean Line in its route identification process and comments received by DOE during the scoping period for the NEPA review of the Project or a combination of these sources. Table 4.1-1, "Summary of GIS Data Sources for Existing Environmental Conditions,".

Table 4.1-1
Summary of GIS Data Sources for Existing Environmental Conditions

Resources Evaluated	Data Sources
Land Use	
Existing Land Cover	▪ USGS 2014
Co-Location with Existing Linear Infrastructure	▪ Clean Line 2013c(1) ▪ ESRI 2012 ▪ Ventyx 2013(2)
Publicly Owned or Managed Resources	
Federal Agency Land	
National Forests (USDA Forest Service) Special Management Areas, Administrative Boundaries, Designated Roadless Areas, Recreation Opportunity Spectrum	▪ USDA Forest Service 2003 ▪ USDA Forest Service 2009a
USFWS special management areas, national wildlife refuge and WMAs, national natural landmarks, research natural areas, approved acquisition areas	▪ USFWS 2012a
USACE easements, mitigation banks, mitigation areas, dredge disposal sites, future approved areas, and future acquisition areas	▪ USACE n.d.
National Parks (NPS)	▪ ESRI 2010

Table 4.1-1
Summary of GIS Data Sources for Existing Environmental Conditions

Resources Evaluated	Data Sources
Department of Defense Lands	▪ ESRI 2012
Tribal Lands	▪ BIA n.d. (a)(3) ▪ BIA n.d. (b)(3) ▪ Clean Line 2013d (3)
State Agency Land	
State Parks (Oklahoma Tourism and Recreation Department, Arkansas Department of Parks and Tourism, TDEC, Division of Parks and Conservation, State Parks, and TPWD)	▪ ESRI 2010 ▪ DOE 2013a, 2013b ▪ AHTD 2006 ▪ TDEC 2011 ▪ TPWD 2011
State-Owned WMAs (owned by ODWC, AGFC, TWRA, and TPWD)	▪ ODWC 2011; 2012 ▪ AGFC 2005 (ongoing) ▪ TWRA 2007 ▪ Koordinates 2006
Arkansas WMAs (leased by AGFC)	▪ AGFC 2013
Oklahoma State School Lands Trust (The Commissioners of the Land Office)	▪ Clean Line 2013e
Arkansas Natural Areas (ANHC)(4)	▪ ANHC n.d.
Tennessee Natural Areas (TDEC, Division of Natural Areas, Natural Areas Program)	▪ TDEC 2011
Local Agency Land	
County-, City-, and Town-owned Lands that are Managed for Conservation or Recreation	▪ ESRI 2010 ▪ DOE 2013a, 2013b
Natural and Recreation Areas	
Conservation Easements (5)	▪ USDA NRCS 2013a ▪ USDA NRCS n.d.(a) ▪ USDA NRCS n.d.(b) ▪ ODWC n.d. ▪ ANHC n.d.(4) ▪ TNC Oklahoma 2008 ▪ TNC Arkansas n.d.
Local Recreational Areas	▪ ESRI 2010
Wild and Scenic Rivers	▪ USDA Forest Service 2009b
Land Uses of Special Interest	
K-12 Schools, Colleges, and Universities	▪ Clean Line 2013f(6)
Residences	▪ Clean Line 2013f(6)
Churches	▪ Clean Line 2013f(6)

Table 4.1-1
Summary of GIS Data Sources for Existing Environmental Conditions

Resources Evaluated	Data Sources
Cemeteries	▪ Clean Line 2013f(6) ▪ ESRI 2012
Agricultural, Commercial, and Industrial Structures	▪ Clean Line 2013f(6) ▪ Arkansas Oil and Gas Commission, n.d. ▪ TWDB 2013
Airports and Airstrips	▪ Clean Line 2013f(7) ▪ USGS 2010 ▪ DOE 2013a, 2013b
Surface Water Resources	
Surface Water	▪ USGS NHD 2012 ▪ ESRI 2012 ▪ Clean Line 2013g
Wetlands	
Wetlands	▪ USFWS 2012b(8) ▪ USGS 2006(8, 9j) ▪ USDA NRCS 2013b
Floodplains	
Base and critical-action floodplains	▪ FEMA n.d. ▪ FEMA 2013a ▪ FEMA 2013b(10)
Wildlife Resources	
Critical Habitat	▪ USFWS 2012c

Notes:

(1) Clean Line created this dataset based on aerial photo interpretation of existing transmission lines and transmission lines under construction as of June 1, 2013.

(2) The Ventyx dataset (2013) includes both intrastate and interstate pipelines. Each pipeline has been assigned pipeline operator and diameter attributes. This dataset also includes information about proposed pipeline projects.

(3) Due to data licensing agreements, use of these data are limited or restricted, and this information cannot be depicted on mapping.

(4) The ANHC holds fee title or conservation easements on lands in Arkansas referred to as Natural Areas.

(5) No known state of Tennessee conservation easements occur in the Analysis Area; therefore, no data sources for this resource in this state are listed.

(6) Clean Line created a data layer based on ESRI 2012 data supplemented with aerial photointerpretation and field verification surveys conducted in 2012 and 2013.

(7) Clean Line created a Private Airstrips and Helipads data layer based on aerial photointerpretation, comments obtained during Clean Line stakeholder outreach (2010-2013), and DOE Scoping Comments (2013).

Table 4.1-1 Summary of GIS Data Sources for Existing Environmental Conditions	
Resources Evaluated	**Data Sources**

(8) NWI data were used, where available. NWI data are not available in portions of Crawford, Mississippi, Poinsett, and White Counties, Arkansas, or all of Cleburne, Conway, Faulkner, Franklin, Johnson, Pope, and Van Buren Counties, Arkansas. The USGS NLCD was used instead of NWI data in counties where complete NWI data coverage is not available.

(9) Clean Line compared the USGS NLCD data to aerial imagery.

(10) The NFHL, published by FEMA, is the primary source of data used in this report for base and critical action floodplains. NFHL coverage is not available for Sherman, Hansford, and Ochiltree Counties, Texas; Beaver, Harper, and Major Counties, Oklahoma; and Van Buren and Jackson Counties, Arkansas. Q3 data are available in Van Buren and Jackson Counties, Arkansas, and are used in this report. Q3 data are not available for Sherman, Hansford, and Ochiltree Counties, Texas, or for Beaver, Harper, and Major Counties, Oklahoma, and any Digital Flood Insurance Rate Map (DFIRM) data available in these counties do not overlap with the Project's Analysis Area. Clean Line contacted these county governments to obtain any available alternative floodplain data, but none were available. Therefore, there are gaps in floodplain coverage for the Project's Analysis Area in Sherman, Hansford, and Ochiltree Counties, Texas; and Beaver, Harper, and Major Counties, Oklahoma.

Key:

AGFC = Arkansas Game and Fish Commission
AHTD = Arkansas Highway and Transportation Department
ANHC = Arkansas Natural Heritage Commission
DOE = (United States) Department of Energy
ESRI = Environmental Systems Research Institute, Inc.
FEMA = Federal Emergency Management Agency
N/A = Not Applicable
NLCD = National Land Cover Database
NPS = National Park Service
NRCS = Natural Resources Conservation Service
NWI = National Wetland Inventory
ODWC = Oklahoma Department of Wildlife Conservation
TDEC = Tennessee Department of Environment and Conservation
TNC = The Nature Conservancy
TPWD = Texas Parks and Wildlife Department
TWRA = Tennessee Wildlife Resources Agency
USACE = United States Army Corps of Engineers
USDA = United States Department of Agriculture
USFWS = United States Fish and Wildlife Service
USGS = United States Geological Survey
WMA = Wildlife Management Area

4.2 Existing Conditions within the Project Disturbance Footprint Action Area

This section summarizes the existing conditions with the project disturbance footprint for the converter station siting areas (Section 4.2.1, "Converter Station Siting Areas"), Clean Line's Proposed HVDC

Transmission Line Route (Section 4.2.2, "HVDC Transmission Line (Clean Line's Proposed Route)"), and the AC Collection System alternatives (Section 4.2.3, "AC Collection System Transmission Line Alternatives").

4.2.1 Converter Station Siting Areas

The existing conditions for Clean Line's converter station siting areas are summarized in Table 4.2-1, "Summary of Existing Conditions within the Converter Station Siting Areas." This information, coupled with other conditions important to individual species analyses that may be further identified and described in the species-specific analysis discussions (see Section 5, "Species Evaluations") form the basis of the Environmental Baseline.

**Table 4.2-1
Summary of Existing Conditions
within the Converter Station Siting Areas**

Resource	Unit	Texas County Converter Station Siting Area	Shelby Converter Station Siting Area	Arkansas Converter Station Alternative Siting Area
Total Size	Acres	623.1	740.4	21,789.8
Land Use Resources				
Existing Land Cover				
Developed, Open Space [a]	Acres	26.2	17.7	574.3
Developed, Low Intensity [b]	Acres	0.0	7.0	53.8
Developed, Medium Intensity [c]	Acres	0.0	0.0	23.1
Developed, High Intensity [d]	Acres	0.0	0.0	2.4
Pasture/Hay	Acres	0.0	197.1	4534.6
Cultivated Crops	Acres	0.0	396.4	20.0
Open Water	Acres	0.0	0.0	83.3
Barren Land	Acres	0.0	0.0	50.7
Deciduous Forest	Acres	0.0	77.6	5407.6
Evergreen Forest	Acres	0.0	1.1	7,877.4
Mixed Forest	Acres	0.0	1.1	1,853.6
Shrub/Scrub	Acres	6.0	14.6	494.4
Grassland/Herbaceous	Acres	590.0	0.0	697.4
Woody Wetlands	Acres	0.0	27.7	113.1
Emergent Herbaceous Wetlands	Acres	0.0	0.0	3.8
Publicly Owned or Managed Resources				
National Forests (U.S. Forest Service) – Managed	Acres	0.0	0.0	0.0
National Wildlife Refuges (U.S. Fish and Wildlife Service)	Acres	0.0	0.0	0.0
National Parks (National Park Service)	Acres	0.0	0.0	0.0

Table 4.2-1
Summary of Existing Conditions within the Converter Station Siting Areas

Resource	Unit	Texas County Converter Station Siting Area	Shelby Converter Station Siting Area	Arkansas Converter Station Alternative Siting Area
U.S. Army Corps of Engineers (USACE) Lands	Acres	0.0	0.0	0.0
U.S. Department of Defense Lands	Acres	0.0	0.0	0.0
Bureau of Reclamation	Acres	0.0	0.0	0.0
State Parks	Acres	0.0	0.0	0.0
State-Owned WMAs	Acres	0.0	0.0	1585.5
Oklahoma School Lands (The Commissioners of the Land Office)	Acres	0.0	0.0	0.0
Arkansas Natural Areas (Arkansas Natural Heritage Commission)	Acres	0.0	0.0	0.0
Arkansas Leased WMAs (Arkansas Game and Fish Commission)	Acres	0.0	0.0	0.0
County-, City-, and Town-owned Lands that are managed for conservation or recreation	Acres	0.0	0.0	0.0
Tribal Trust Lands and Allotments	Acres	0.0	0.0	0.0
Natural and Recreation Areas				
Conservation Easements				
Federal	Acres	0.0	0.0	0.0
State	Acres	0.0	0.0	0.0
The Nature Conservancy	Acres	0.0	0.0	0.0
Wild and Scenic Rivers	Number	0	0	0
Land Uses of Special Interest				
K-12 Schools, Colleges, and Universities	Number	0	0	0
Churches	Number	0	0	8
Hospitals	Number	0	0	0

Table 4.2-1
Summary of Existing Conditions
within the Converter Station Siting Areas

Resource	Unit	Texas County Converter Station Siting Area	Shelby Converter Station Siting Area	Arkansas Converter Station Alternative Siting Area
Residences	Number	0	0	152
Agricultural, Commercial, and Industrial Structures	Number	3	0	86
Cemeteries	Number	0	0	4
Airports	Number	0	0	0
Surface Water Resources				
Surface Water				
Perennial Streams	Miles	0.0	0.3	12.8
Intermittent Streams	Miles	1.6	4.4	57.9
Major Waterbodies	Miles	0.0	0.0	0.0
Reservoirs	Number	0	0	0
Wetlands				
Total Area within Wetlands	Acres	0.0	5.2[e]	67.2[f]
Floodplains				
Total Area within Zone X	Acres	623.1	177.6	18,491.2
Total Area within Zone A	Acres	0.0	28.8	3,298.6
Total Area within Zone AE	Acres	0.0	108.0	0.0
Wildlife Resources				
USFWS-Designated Critical Habitat [e]	Acres	0.0	0.0	0.0

Table 4.2-1
Summary of Existing Conditions within the Converter Station Siting Areas

Resource	Unit	Texas County Converter Station Siting Area	Shelby Converter Station Siting Area	Arkansas Converter Station Alternative Siting Area

Sources: AGFC 2005 (ongoing), 2013; AHTD 2006; ANHC n.d.; Arkansas Oil and Gas Commission, n.d.; BIA n.d.(a), n.d.(b); Clean Line 2013c, 2013d, 2013e, 2013f, 2013g; DOE 2013a; ESRI 2010, 2012; FEMA n.d., 2013a, 2013b; Koordinates 2006; ODWC n.d., 2011, 2012; TDEC 2011; TNC Arkansas n.d.; TNC Oklahoma 2008; TPWD 2011; TWDB 2013; TWRA 2007; USACE n.d.; USDA Forest Service 2003, 2009a, 2009b; USDA NRCS n.d.(a), n.d.(b), 2013a, 2013b; USFWS 2012a, 2012b, 2012c; USGS 2010, 2014; USGS NHD 2012; Ventyx 2013.

Notes:

(a) Impervious surfaces account for less than 20% of total cover. Includes large-lot single-family residences, parks, cemeteries, and golf courses.

(b) Impervious surfaces account for 20% to 49% of total cover. Primarily includes single-family residences.

(c) Impervious surfaces account for 50% to 79% of total cover. Primarily includes single-family residences.

(d) Impervious surfaces account for 80% to 100% of total cover. Land uses include higher intensity land uses, such as apartment complexes and commercial and industrial buildings.

Key:

USACE = United States Army Corps of Engineers
WMA = Wildlife Management Area
Zone A = Areas subject to inundation by the 1-percent annual-chance flood event generally determined using approximate methodologies.
Zone AE = Areas subject to inundation by the 1-percent annual-chance flood event determined by detailed methods.
Zone X = Zone X may include the following subtypes: 0.2-percent annual-chance flood hazard; area of minimal flood hazard; or, area with reduced flood risk due to levee.

4.2.1.1 Texas County Converter Station Siting Area

The Texas County Converter Station Siting Area is located on 623.1 acres in Texas County, Oklahoma. Land cover is primarily grassland/herbaceous (95% [590.0 acres]). No publicly owned or managed lands, or federal or state natural or recreational areas, are located within the Texas County Converter Station Siting Area.

There are 1.6 miles of intermittent streams located within the Texas County Converter Station Siting Area, but no perennial streams, major waterbodies, reservoirs, or National Wetlands Inventory (NWI) wetlands are located within the Texas County Converter Station Siting Area. The entire site is located outside of the 100-year floodplain.

4.2.1.2 Shelby Converter Station Siting Area

The Shelby Converter Station Siting Area is located on 740.4 acres in Shelby County, Tennessee. Land cover consists primarily of cultivated crops (54% [396.4 acres]) and pasture/hay (27% [197.1 acres]). No publicly owned or managed lands, or federal or state natural or recreational areas are located within the Shelby Converter Station Siting Area.

There are 0.3 miles of perennial streams (Big Creek) and 4.4 miles of intermittent streams located within the Shelby Converter Station Siting Area, but no major waterbodies or reservoirs. Big Creek flows south along the western boundary of the siting area. National Wetlands Inventory-designated wetlands comprise <1% (5.2 acres) of the siting area. Approximately 18% (136.8 acres) of the site is underlain by 100-year floodplain.

4.2.1.3 Arkansas Converter Station Alternative Siting Area

The Arkansas Converter Station Alternative Siting Area is located on 21,789.8 acres in Pope and Conway Counties, Arkansas. The Arkansas converter site is anticipated to encompass approximately 40 to 50 acres; however, the location has not been identified at this time. Land cover consists primarily of evergreen forest (36% [7,877.4 acres]), deciduous forest (25% [5,407.6 acres]), and pasture/hay (21% [4,534.6 acres]). The Rainey WMA is located within the Arkansas Converter Station Alternative Siting Area. No other federal or state natural or recreational areas are located within the Arkansas Converter Station Alternative Siting Area.

There are 12.8 miles of perennial streams (Hackers Creek and West Fork Point Remove Creek) and 57.9 miles of intermittent streams located within the Arkansas Converter Station Alternative Siting Area but no major waterbodies or reservoirs. According to the United States Geological Survey National Land Cover Database, wetlands comprise <1% (67.2 acres) of the siting area. (USFWS NWI mapping is not available for the Arkansas Converter Station Alternative Siting Area). Approximately 15% (3,298.6 acres) of the site is underlain by 100-year floodplain.

4.2.2 HVDC Transmission Line (Clean Line's Proposed Route)

The existing conditions for the project disturbance footprint of the representative ROW for Clean Line's Proposed HVDC Transmission Line Route are summarized in Table 4.2-2, "Summary of Existing Conditions within the Project Disturbance Footprint of the HVDC Transmission Line Representative Right-of-Way." Clean Line divided the Project into seven regions based on geographic similarities. Each of these regions is described below to provide additional context for the existing conditions for the proposed HVDC transmission line route. This information, coupled with other conditions important to individual species analyses that may be further identified and described in the species-specific analysis discussion (see Section 5, "Species Evaluations") form the basis of the Environmental Baseline.

Table 4.2-2
Summary of Existing Conditions within the Project Disturbance Footprint of the HVDC Transmission Line Representative Right-of-Way

Resource	Unit	Proposed Route Total in Region 1	Proposed Route Total in Region 2	Proposed Route Total in Region 3	Proposed Route Total in Region 4	Proposed Route Total in Region 5	Proposed Route Total in Region 6	Proposed Route Total in Region 7
Total Length	Miles	115.9	106.2	162.1	126.7	113.2	54.5	42.9
Land Use Resources								
Existing Land Cover [a]								
Developed, Open Space [b]	Acres	160.4	222.3	188.0	84.1	79.5	81.1	92.4
Developed, Low Intensity [c]	Acres	3.9	12.0	5.0	16.5	13.1	1.1	8.6
Developed, Medium Intensity [d]	Acres	1.2	2.8	1.3	0.7	9.8	3.1	0.0
Developed, High Intensity [e]	Acres	0.0	0.0	0.2	0.0	0.1	0.0	0.0
Pasture/Hay	Acres	0.0	0.0	933.1	1429.3	776.7	3.2	37.5
Cultivated Crops	Acres	755.1	792.1	310.1	63.9	148.4	1047.7	682.2
Open Water	Acres	13.2	4.7	13.0	8.3	9.8	12.3	25.7
Barren Land	Acres	0.5	0.0	2.4	2.5	14.6	0.0	0.0
Deciduous Forest	Acres	0.0	22.5	1087.9	802.8	807.6	89.9	79.0
Evergreen Forest	Acres	0.0	196.5	49.2	405.0	441.6	0.0	0.7
Mixed Forest	Acres	0.0	29.4	0.0	112.8	297.5	6.6	1.5
Shrub/Scrub	Acres	142.7	8.9	0.0	40.1	41.2	0.0	50.4
Grassland/Herbaceous	Acres	1727.7	1284.5	1339.3	82.3	79.0	0.5	1.2
Woody Wetlands	Acres	4.4	0.0	0.9	20.2	25.4	75.2	61.6
Emergent Herbaceous Wetlands	Acres	0.0	0.0	0.0	2.6	0.3	1.7	0.8
Parallels with Existing Linear Infrastructure [a]								
Transmission Line ≥69kV	Miles	85.0	34.2	53.0	25.8	6.2	10.0	2.5
Pipeline	Miles	13.6	13.4	21.1	5.6	24.8	0.9	0.5
Railroad	Number	0	3	4	5	1	2	3
Road	Miles	5.2	4.4	5.8	7.1	7.1	1.8	2.5
Total Paralleling Existing Linear Infrastructure	Miles	86.2	49.1	71.0	36.5	34.9	12.4	5.1
Publicly Owned or Managed Resources [a]								
National Forests (U.S. Forest Service) – Owned	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
National Wildlife Refuges (USFWS)	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
National Parks (National Park Service)	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S. Army Corps of Engineers Lands	Acres	0.0	0.0	0.0	28.2	0.0	0.0	0.0
U.S. Department of Defense Lands	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bureau of Reclamation	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 4.2-2
Summary of Existing Conditions within the Project Disturbance Footprint of the HVDC Transmission Line Representative Right-of-Way

Resource	Unit	Proposed Route Total in Region 1	Proposed Route Total in Region 2	Proposed Route Total in Region 3	Proposed Route Total in Region 4	Proposed Route Total in Region 5	Proposed Route Total in Region 6	Proposed Route Total in Region 7
State Parks	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
State-Owned WMAs	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oklahoma School Lands (The Commissioners of the Land Office)	Acres	0.0	12.0	103.8	0.0	76.9	0.3	0.0
Arkansas Natural Areas (Arkansas Natural Heritage Commission)	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Arkansas Leased WMAs (Arkansas Game and Fish Commission)	Acres	0.0	0.0	0.0	2.4	0.0	0.3	0.0
County-, City-, and Town-owned Lands that are managed for conservation or recreation	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tribal Trust Lands and Allotments	Acres	0.0	0.0	0.0	8.9	0.0	0.0	0.0
Natural and Recreation Areas [a]								
Conservation Easements								
Federal	Acres	0.0	0.0	0.0	5.5	0.0	0.3	2.2
State	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Nature Conservancy	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wild and Scenic Rivers	Number	0	0	0	0	0	0	0
Land Uses of Special Interest								
K-12 Schools, Colleges, and Universities [a]	Number	0	0	0	0	0	0	0
Churches [a]	Number	0	0	0	0	0	0	0
Hospitals [a]	Number	0	0	0	0	0	0	0
Residences								
0 to 100 feet from Representative Centerline	Number	1	0	2	0	0	0	0
100 to 250 feet from Representative Centerline	Number	2	3	7	21	6	10	6
250 to 500 feet from Representative Centerline	Number	6	17	101	118	72	18	25
500 to 1,000 feet from Representative Centerline	Number	7	40	253	345	249	29	65
Agricultural, Commercial, and Industrial Structures [a]	Number	1	4	4	3	0	4	2
Cemeteries [a]	Number	0	0	0	1	0	0	0
Airports within 1 mile	Number	0	0	1	1	0	0	0

Table 4.2-2
Summary of Existing Conditions within the Project Disturbance Footprint of the HVDC Transmission Line Representative Right-of-Way

Resource	Unit	Proposed Route Total in Region 1	Proposed Route Total in Region 2	Proposed Route Total in Region 3	Proposed Route Total in Region 4	Proposed Route Total in Region 5	Proposed Route Total in Region 6	Proposed Route Total in Region 7
Surface Water Resources								
Surface Water [a]								
Perennial Streams Crossed by Centerline	Number	10	4	175	65	26	11	11
Intermittent Streams Crossed by Centerline	Number	114	78	150	231	196	68	205
Major Waterbodies Crossed by Centerline	Number	3	2	1	8	5	1	5
Reservoirs Crossed by Centerline	Number	0	0	0	0	2	0	0
Wetlands [a, f]								
Total Area within Wetlands	Acres	8.9	6.1	35.1	31.0	0.2	8.1	42.0
Centerline Crossings > 1,000 feet	Number	0	0	0	0	2	0	0
Floodplains [a]								
Area within Floodplains [a]								
Zone A	Acres	52.2	156.3	292.7	411.3	213.4	660.7	115.1
Zone AE	Acres	0.0	0.0	0.0	132.6	89.9	0.0	228.3
Zone AH	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zone AO	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1-percent-annual-chance Subtotal	Acres	*52.2*	*156.3*	*292.7*	*543.9*	*303.2*	*660.7*	*343.4*
Zone X	Acres	529.0	1150.3	3641.3	2533.0	2446.9	664.4	700.8
Total	Acres	581.2	1306.6	3934.0	3096.9	2750.1	1325.1	1044.3
Number of Centerline Crossings > 1,000 feet [a]								
Zone A	Number	3	8	16	18	11	14	6
Zone AE	Number	0	0	0	8	2	0	6
Zone AH	Number	0	0	0	0	0	0	0
Zone AO	Number	0	0	0	0	0	0	0
1-percent-annual-chance Subtotal	Number	*3*	*8*	*16*	*26*	*13*	*14*	*12*
Zone X	Number	4	10	72	44	44	15	16
Total	Number	*7*	*18*	*81*	*70*	*57*	*29*	*28*
Wildlife Resources								
USFWS-Designated Critical Habitat [a]	Acres	0.0	1.3	0.0	0.0	0.0	0.0	0.0

Table 4.2-2
Summary of Existing Conditions within the Project Disturbance Footprint of the HVDC Transmission Line Representative Right-of-Way

Resource	Unit	Proposed Route Total in Region 1	Proposed Route Total in Region 2	Proposed Route Total in Region 3	Proposed Route Total in Region 4	Proposed Route Total in Region 5	Proposed Route Total in Region 6	Proposed Route Total in Region 7

Sources: AGFC 2005 (ongoing), 2013; AHTD 2006; ANHC n.d.; Arkansas Oil and Gas Commission, n.d.; BIA n.d. (a), n.d. (b); Clean Line 2013c, 2013d, 2013e, 2013f, 2013g; DOE 2013a; ESRI 2010, 2012; FEMA n.d., 2013a, 2013b; Koordinates 2006; ODWC n.d., 2011, 2012; TDEC 2011; TNC Arkansas n.d.; TNC Oklahoma 2008; TPWD 2011; TWDB 2013; TWRA 2007; USACE n.d.; USDA Forest Service 2003, 2009a, 2009b; USDA NRCS n.d.(a), n.d.(b), 2013a, 2013b; USFWS 2012a, 2012b, 2012c; USGS 2010, 2014; USGS NHD 2012; Ventyx 2013.

Notes:

(a) Within the 200-foot-wide Representative Right-of-Way.

(b) Impervious surfaces account for less than 20% of total cover. Includes large-lot single-family residences, parks, cemeteries, and golf courses.

(c) Impervious surfaces account for 20% to 49% of total cover. Primarily includes single-family residences.

(d) Impervious surfaces account for 50% to 79% of total cover. Primarily includes single-family residences.

(e) Impervious surfaces account for 80% to 100% of total cover. Land uses include higher intensity land uses, such as apartment complexes and commercial and industrial buildings.

(f) USFWS NWI data are available for all counties in Regions 1, 2, and 3. Within Region 4, USFWS NWI data are not available in Franklin, Johnson, and Pope Counties, or portions of Crawford County. Where there are data gaps in USFWS NWI coverage, USGS NLCD was used instead. Within Region 5, USFWS NWI data are not available in Pope, Conway, Van Buren, and Cleburne Counties, or portions of White County; USGS NLCD was used in these counties instead. Within Region 6, USFWS NWI data are not available in portions of Poinsett County; USGS NLCD was used in Poinsett County instead. Within Region 7, USFWS NWI data are not available in portions of Poinsett County; USGS NLCD was used in Poinsett County instead.

Key:

HVDC = high-voltage direct current
kV = kilovolt
USACE = United States Army Corps of Engineers
USFWS = United States Fish and Wildlife Service
WMA = Wildlife Management Area
Zone A = Areas subject to inundation by the 1-percent annual-chance flood event generally determined using approximate methodologies.
Zone AE = Areas subject to inundation by the 1-percent annual-chance flood event determined by detailed methods.
Zone AH = Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are 1–3 feet.
Zone AO = Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are 1–3 feet.
Zone X = Zone X may include the following subtypes: 0.2-percent annual-chance flood hazard; area of minimal flood hazard; or, area with reduced flood risk due to levee.

4.2.2.1 Region 1(Oklahoma Panhandle)

Region 1 begins at the proposed converter station site located in Texas County, Oklahoma, and continues east through Texas, Beaver, Harper, and Woodward Counties, Oklahoma, for 116 miles. This segment terminates near the intersection of the Harper/Woodward county line and State Route (S.R.) 34, north of Woodward, in Harper County, Oklahoma. Land cover in Region 1 is agricultural—primarily pasture and cultivated crops. Towns near the Project in this region include Hardesty, Laverne, and May, Oklahoma.

Clean Line's Proposed Route in Region 1 is 115.9 miles, with 74% (86.2 miles) of the route paralleling existing linear infrastructure. The primary existing linear corridors in Region 1 that are paralleled by the Proposed Route include:

- Southwestern Public Service Company's Finney-to-Hitchland 345kV electrical transmission line; and
- Xcel/Oklahoma Gas & Electric (OG&E) Woodward-to-Hitchland 345kV electrical transmission line.

Land cover is dominated by grassland/herbaceous (62% [1,727.7 acres]) and cultivated crops (27% [755.1 acres]). There are no airports or airstrips within 1 mile of the representative ROW.

Three major waterbodies (Palo Duro Creek, Kiowa Creek, and Beaver River) are within the representative ROW in Region 1. Less than 1% of (8.9 acres) of the representative ROW in Region 1 consists of wetlands; none of these crossings are more than 1,000 feet long. Additionally, seven 100- or 500-year floodplains more than 1,000 feet in length are crossed by the representative centerline in Region 1.

4.2.2.2 Region 2 (Oklahoma Central Great Plains)

Region 2 begins 11 miles north of Woodward, Oklahoma, at the intersection of the Harper/Woodward county line and S.R. 34, continues southeastward through Woodward, Major, and Garfield Counties, Oklahoma, for 106 miles, and terminates 16 miles southeast of Enid, Oklahoma, near the Garfield/Kingfisher county line. Land cover in Region 2 generally includes forested areas dominated by cedar, agricultural lands consisting of pasture and cultivated crops, and rural residential developed areas. Towns near the Project in this region include Moreland, Fairview, Cleo Springs, Isabella, Ames, and Bison, Oklahoma.

Clean Line's Proposed Route in Region 2 is 106.2 miles, with 46% (49.1 miles) of the route paralleling existing linear infrastructure. The primary existing linear corridors in Region 2 that are paralleled by the Proposed Route include:

- Western Farmers Electric Cooperative's existing 115kV electrical transmission line;
- U.S. Route 60; and
- Several county roads.

Land cover is dominated by grassland/herbaceous (50%[1,284.5 acres]); cultivated crops (31% [792.1 acres]); developed, open space (9% [222.3 acres]); and evergreen forest (8% [196.5 acres]).

There are no airports or airstrips within 1 mile of the representative ROW. Approximately 12.0 acres of Oklahoma School Lands are located within the representative ROW. Two major waterbodies (Cimarron River and Turkey Creek) are within the representative ROW in Region 2. Less than 1% of (6.1 acres) of the representative ROW in Region 2 consists of wetlands; none of these wetland crossings are more than 1,000 feet long. Additionally, eighteen 100- or 500-year floodplains more than 1,000 feet in length are crossed by the representative centerline in Region 2.

4.2.2.3 Region 3 (Oklahoma Cross Timbers)

Region 3 begins 21 miles southeast of Enid, Oklahoma, near the intersection of the Kingfisher/Logan/Garfield County lines, continues southeastward through Garfield, Kingfisher, Logan, Payne, Lincoln, Creek, Okmulgee, and Muskogee Counties for 162 miles, and terminates north of Webbers Falls, Oklahoma, at the Arkansas River. Land cover in Region 3 includes forested areas consisting of both cedar and mixed hardwoods, agricultural lands consisting of pasture and cultivated crops, and residential and commercial developed areas. From Stillwater to the eastern boundary of Region 3, residential development increases (as compared with the western third of this region), particularly near Stillwater, Cushing, Drumright, Depew, Bristow, Winchester, Beggs, Muskogee, and Webbers Falls, Oklahoma. Towns near the Project in this Region include Marshall, Orlando, Mulhall, Perkins, Ripley, Cushing, Shamrock, Winchester, Beggs, Summit, Oktaha, and Webbers Falls, Oklahoma.

Clean Line's Proposed Route in Region 3 is 162.1 miles, with 44% (71.0 miles) paralleling existing linear infrastructure. The primary existing linear corridors in Region 3 that are paralleled by the Proposed Route include:

- OG&E's Cottonwood Creek-to-Enid 138kV electrical transmission line;
- County Road 67;
- KAMO Electric Cooperative, Inc. Stillwater-to-Ramsey 115kV electrical transmission line;
- KAMO Electric Cooperative, Inc. Stillwater-to-Cushing 69kV electrical transmission line;
- Several county roads;
- An unnamed pipeline; and
- OG&E's Beggs-to-Pecan Creek 138kV electrical transmission line.

Land cover is predominantly grassland/herbaceous (34% [1,339.3 acres]), deciduous forest (28% [1,087.9 acres]), pasture/hay (24% [933.1 acres]), and cultivated crops (8% [310.1 acres]). Approximately 103.8 acres of Oklahoma School Lands are located within the representative ROW. The Cushing Municipal Airport is within 1 mile of the representative ROW.

There is one major waterbody (Cimarron River) within the representative ROW in Region 3. Less than 1% of (35.1 acres) of the representative ROW in Region 3 consists of wetlands; none of these wetland crossings are more than 1,000 feet long. Additionally, eighty-one 100- or 500-year floodplains more than 1,000 feet in length are crossed by the representative centerline in Region 3.

4.2.2.4 Region 4 (Arkansas River Valley)

Region 4 begins 0.6 miles north of Webbers Falls in Muskogee County, Oklahoma, continues east though Muskogee and Sequoyah Counties, Oklahoma, and Crawford, Franklin, Johnson, and Pope Counties, Arkansas, for 127 miles, and terminates 13 miles north of Russellville, Arkansas. Land cover in Region 4 consists primarily of open lands, pasture, and mixed pine/hardwood forest or planted pine. Towns near the Project in this region include Webbers Falls, Gore, Vian, Marble City, and Sallisaw, Oklahoma, and Cedarville, Van Buren, Alma, Kibler, Dyer, Mulberry, Ozark, Wiederkehr Village, and Clarksville, Arkansas.

Clean Line's Proposed Route in Region 4 is 126.67 miles with 29% (36.48 miles) paralleling existing linear infrastructure. The primary existing linear corridors in Region 4 that are paralleled by the Proposed Route include:

- Several existing electrical transmission lines across the Arkansas River;
- OG&E's Muskogee-to-Fort Smith 345kV electrical transmission line;
- Gore-to-Alma 138kV transmission line;
- Several county roads;
- I-40;
- Alma-to-Dardanelle 138kV electrical transmission line; and
- An unnamed transmission line.

Land cover is dominated by pasture/hay (47% [1,429.3 acres]), deciduous forest (26% [802.8 acres]) evergreen forest (13% [405.0 acres]), and mixed forest (4%; [112.8 acres]). The municipal boundaries of Gore, Oklahoma; Vian, Oklahoma; and Mulberry and Ozark, Arkansas are within the representative ROW. Approximately 28.2 acres of United States Army Corps of Engineers (USACE) lands at the Arkansas River crossing; 2.4 acres of Arkansas leased WMAs (i.e., Frog Bayou and Ozark Lake WMAs); and 8.9 acres of tribal trust lands and allotments in the vicinity of the Arkansas River are located within the representative ROW.

The Franklin County Airport is within 0.5 miles of the representative ROW.

Additionally, 5.5 acres of federal conservation easements are located within the representative ROW.

Eight major waterbodies (Arkansas River, Illinois River, Lee Creek, Frog Bayou, Big Piney Creek, and Mulberry River) are within the representative ROW in Region 4. Approximately 1% (31.0 acres) of the representative ROW in Region 4 consists of wetlands; none of these wetland crossings are more than 1,000 feet long. There are seventy 100- or 500-year floodplains more than 1,000 feet in length crossed by the representative centerline in Region 4.

4.2.2.5 Region 5 (Central Arkansas)

Region 5 begins 13 miles north of Russellville, in Pope County, Arkansas, continues east for 113 miles through Pope, Conway, Van Buren, Faulkner, Cleburne, White, and Jackson Counties, Arkansas, and terminates 10 miles southwest of Newport, in Jackson County, Arkansas. Land cover in Region 5 comprises forested areas consisting of both mixed hardwoods and planted pine, open lands for pasture or cultivated crops, and rural residential development. Towns near the Project in this Region include Damascus, Quitman, Letona, Twin Groves, Guy, and Rose Bud.

Clean Line's Proposed Route in Region 5 is 113.2 miles, with 31% (34.9 miles) of the route paralleling existing linear infrastructure. The primary existing linear corridors in Region 5 that are paralleled by the Proposed Route include:

- Entergy Arkansas, Inc.'s Independence-to-Genpower Keo 500kV electrical transmission line;
- Two existing transmission pipelines.

Land cover is dominated by deciduous forest (29% [807.6 acres]), pasture/hay (28% [776.7 acres]), evergreen forest (16% [441.6 acres]), mixed forest (11% [297.5 acres]), and cultivated crops (5% [148.4 acres]). The municipal boundaries of Quitman and Letona, Arkansas, are within the representative ROW. Approximately 76.9 acres of Oklahoma School Lands are located within the representative ROW. There are no airports or airstrips within 1 mile of the representative ROW.

Five major waterbodies (Illinois Bayou, Cadron Creek, Little Red River, and the White River) are within the representative ROW in Region 5. Less than 1% (0.2 acres) of the representative ROW in Region 5 consists of wetlands; two crossings are more than 1,000 feet long. Additionally, fifty-seven 100- or 500-year floodplains more than 1,000 feet in length are crossed by the representative centerline in Region 5.

4.2.2.6 Region 6 (Cache River and Crowley's Ridge)

Region 6 begins just east of U.S. Route 67, 10 miles southwest of Newport in Jackson County, Arkansas, continues northeast through Jackson, Cross, and Poinsett Counties, Arkansas, for 55 miles and terminates 3 miles south of Marked Tree, in Poinsett County, Arkansas. With the exception of the Crowley's Ridge area, land cover in Region 6 consists of cultivated crops such as rice, corn, and soybeans. Crowley's Ridge consists mostly of hardwood forest and planted pine. Towns near the Project in this region include Amagon and Fisher, Arkansas.

Clean Line's Proposed Route in Region 6 is 54.5 miles, with 23% (12.4 miles) of the route paralleling existing linear infrastructure. The primary existing linear corridors in Region 6 that are paralleled by the Proposed Route include:

- Several county roads;
- Entergy Arkansas Inc.'s Fisher-to-Cherry Valley 161kV electrical transmission line; and
- St. Francis Levee.

Land cover is dominated by cultivated crops (80% [1,055.85 acres]); deciduous forest (7%; 89.24 acres); and developed, open space (6%; 85.31 acres). Approximately 0.26 acres of Oklahoma School Lands and 0.28 acres of Arkansas leased WMAs (i.e., St. Francis Sunken Lands WMA) are located within the representative ROW. There are no airports or airstrips within 1 mile of the representative ROW.

Approximately 0.3 acres of federal conservation easements are located within the representative ROW.

There is one major waterbody (Cache River) in the representative ROW in Region 6. Less than 1% (8.1 acres) of the representative ROW in Region 6 consists of wetlands; none of the wetland crossings are more than 1,000 feet long. Additionally, twenty-nine 100- or 500-year floodplains more than1,000 feet in length are crossed by the representative centerline in Region 6.

4.2.2.7 Region 7 (Arkansas Mississippi River Delta and Tennessee)

Region 7 begins 3 miles south of Marked Tree, in Poinsett County, Arkansas, continues east and southeast through Poinsett and Mississippi Counties, Arkansas, across the Mississippi River and into Tipton and Shelby Counties, Tennessee, for 43 miles, terminating near the Tipton/Shelby county line south of Tipton, Tennessee. Land cover in the region west of the Mississippi River is cultivated, agricultural crops; land cover east of the Mississippi River is a mix of hardwood forests, residential and commercial development, and open land areas. Towns near the Project in this Region include Marked Tree, Tyronza, and Birdsong, Arkansas, and Drummonds, Millington, Tipton, Munford, and Atoka, Tennessee.

Clean Line's Proposed Route in Region 7 is 42.9 miles with 12% (5.1 miles) paralleling existing linear infrastructure. The primary existing linear corridors in Region 7 that are paralleled by the Proposed Route include:

- Entergy Arkansas Inc.'s Marked Tree-to-Marion 161kV electrical transmission line;
- Several county roads; and
- Walker Road in Millington, Tennessee.

Land cover is dominated by cultivated crops (65% [682.2 acres]); developed, open space (9% [92.4 acres]); deciduous forest (8% [79.0 acres]); and woody wetlands (6% [61.6 acres]). The municipal boundaries of Millington, Tennessee, are within the representative ROW. There are no airports or airstrips within 1 mile of the representative ROW.

Approximately 2.2 acres of federal conservation easements are located within the representative ROW.

Five major waterbodies (the St. Francis River and the Mississippi River) are within the representative ROW in Region 7. Approximately 4% (42.0 acres) of the representative ROW in Region 7 consists of wetlands; none of these wetland crossings are more than 1,000 feet long. Additionally, twenty-eight 100- or 500-year floodplains more than 1,000 feet in length are crossed by the representative centerline in Region 7.

4.2.3 AC Collection System Transmission Line Alternatives

Clean Line identified 13 AC Collection System Transmission Line Corridors connecting the Texas County Converter Station Siting Area to the WDZs. The locations and numbers of AC transmission lines will be known after Clean Line has more information about potential wind farm development, including, but not limited to: which WDZs are likely to develop; where individual wind farms may be located within a given WDZ and the point of interconnection between the wind farms and the AC Collection System. Clean Line anticipates four to six AC collection lines up to 345 kV from the Texas County Converter Station to points in the Oklahoma Panhandle region.

The existing conditions within the project disturbance footprint of the project disturbance footprint of the representative ROW for Clean Line's 13 proposed AC Collection System alternatives is summarized in Table 4.2-3, "Summary of Existing Conditions within the Project Disturbance Footprint of the AC Collection System Transmission Line Representative Right-of-Way." This information, coupled with other conditions important to individual species analyses that may be further identified and described in the species-specific analysis discussions (see Section 5, "Species Evaluations") form the basis of the Environmental Baseline.

4.2.3.1 Representative ROW E1 of the AC Transmission Line

The representative EI ROW is 29.0 miles with 91% (26.5 miles) of the route paralleling existing linear infrastructure. The primary existing linear corridors that are paralleled by the EI ROW include:

- An existing natural gas transmission pipeline; and
- Guymon-to-Beaver 115kV electrical transmission line.

Predominant land cover includes grassland/herbaceous (81% [569.9acres]); shrub/scrub (7% [49.6 acres]); and cultivated crops (7% [48.0 acres]). The reach of Palo Duro Creek crossed by the representative ROW of E1 is classified as a major waterbody. Four 500-year floodplains more than1,000 feet in length are crossed by the representative centerline. Approximately 1% (10.1 acres) of the representative ROW of E1 consists of wetlands, and the centerline does not cross any wetlands more than 1,000 feet in length.

Table 4.2-3
Summary of Existing Conditions within the Project Disturbance Footprint of the AC Collection System Transmission Line Representative Right-of-Way

Resource	Unit	E 1	E 2	E 3	NE 1	NE 2	NW 1	NW 2	SE 1	SE 2	SE 3	SW 1	SW 2	W 1	Grand Total
Total Length	Miles	29.0	40.0	40.1	29.9	26.2	51.9	56.0	40.2	13.3	49.0	13.3	37.0	20.8	446.9
Land Use Resources															
Existing Land Cover [a]															
Developed, Open Space [b]	Acres	35.9	30.0	164.8	148.6	108.2	524.7	287.6	97.0	20.3	76.3	9.8	121.9	68.9	1,664.0
Developed, Low Intensity [c]	Acres	0.6	0.4	0.9	7.5	0.7	14.9	6.7	0.2	0.0	10.7	0.7	1.5	1.9	46.7
Developed, Medium Intensity [d]	Acres	0.0	0.0	0.0	0.5	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	1.2	2.2
Developed, High Intensity [e]	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Pasture/Hay	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cultivated Crops	Acres	48.0	297.7	106.0	243.5	49.4	87.9	413.8	340.3	130.6	481.7	0.0	33.3	44.6	2276.6
Open Water	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	1.9
Barren Land	Acres	0.0	0.0	0.1	0.0	0.5	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.8
Deciduous Forest	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Evergreen Forest	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mixed Forest	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shrub/Scrub	Acres	49.6	72.0	47.3	38.7	33.0	16.1	23.5	57.0	4.3	57.0	3.0	10.6	11.0	423.0
Grassland/Herbaceous	Acres	569.9	568.5	654.0	286.5	442.8	616.1	626.4	508.3	168.7	561.2	310.7	730.2	378.0	6421.4
Woody Wetlands	Acres	0.8	1.6	0.1	0.0	0.0	0.0	0.0	0.4	0.0	1.6	0.0	0.0	0.0	4.4
Emergent Herbaceous Wetlands	Acres	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
Parallels with Existing Linear Infrastructure [a]															
Transmission Line ≥69kV	Miles	2.7	33.0	0.4	0.0	3.0	0.0	0.0	10.7	0.7	20.0	0.7	0.0	0.0	71.3
Pipeline	Miles	26.3	2.7	4.3	1.1	14.9	0.4	0.7	2.5	11.6	2.7	12.7	22.4	0.4	102.6
Railroad	Number	0	0	0	2	0	1	1	2	0	1	0	0	1	8
Road	Miles	0.6	0.6	0.8	9.1	9.5	31.0	9.0	0.8	0.0	1.0	0.3	6.1	0.8	69.6
Total Paralleling Existing Linear Infrastructure	Miles	26.5	33.1	5.1	9.8	24.0	42.2	9.4	11.3	11.6	20.8	12.7	27.9	2.1	236.3
Publicly Owned or Managed Resources [a]															
National Forests (U.S. Forest Service) – Managed	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.00	0.0	0.0
National Wildlife Refuges (USFWS)	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
National Parks (National Park Service)	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S. Army Corps of Engineers Lands	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S. Department of Defense Lands	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bureau of Reclamation	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
State Parks	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
State-Owned Wildlife Management Areas	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 4.2-3
Summary of Existing Conditions within the Project Disturbance Footprint of the AC Collection System Transmission Line Representative Right-of-Way

Resource	Unit	E 1	E 2	E 3	NE 1	NE 2	NW 1	NW 2	SE 1	SE 2	SE 3	SW 1	SW 2	W 1	Grand Total
Oklahoma School Lands (The Commissioners of the Land Office)	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
County-, City-, and Town-owned Lands that are managed for conservation or recreation	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tribal Trust Lands and Allotments	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural and Recreation Areas [a]															
Conservation Easements															
Federal	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
State	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
The Nature Conservancy	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wild and Scenic Rivers	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Land Uses of Special Interest															
K-12 Schools, Colleges, and Universities [a]	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Churches [a]	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hospitals [a]	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Residences															
0 to 100 feet from Representative Centerline	Number	0	0	0	0	1	0	0	0	0	0	0	0	0	1
100 to 250 feet from Representative Centerline	Number	0	1	0	2	0	1	2	0	0	2	0	0	0	8
250 to 500 feet from Representative Centerline	Number	10	0	0	3	2	5	3	0	0	1	0	0	0	24
500 to 1000 feet from Representative Centerline	Number	12	2	0	2	9	5	0	2	0	2	0	0	0	34
Agricultural, Commercial, and Industrial Structures [a]	Number	2	0	2	0	1	2	0	0	0	0	0	1	1	9
Cemeteries [a]	Number	0	0	0	0	0	1	0	0	0	0	0	1	1	3
Airports within 1 mile	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Surface Water Resources															
Surface Water [a]															
Perennial Streams Crossed by Centerline	Number	5	4	1	6	1	0	6	5	0	4	0	0	0	32
Intermittent Streams Crossed by Centerline	Number	32	44	49	6	23	36	19	36	7	41	20	57	21	391
Major Waterbodies Crossed by Centerline	Number	3	1	1	2	2	2	5	0	0	1	0	1	1	19
Reservoirs Crossed by Centerline	Number	0	0	0	0	0	0	0	0	3	0	0	0	0	3
Wetlands [a]															
Total Area within Wetlands	Acres	10.1	13.3	1.6	0.6	10.0	1.4	0.8	7.5	0.0	13.9	0.0	1.3	0.0	60.5
Centerline Crossings > 1,000 feet	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4.2-3
Summary of Existing Conditions within the Project Disturbance Footprint of the AC Collection System Transmission Line Representative Right-of-Way

Resource	Unit	E 1	E 2	E 3	NE 1	NE 2	NW 1	NW 2	SE 1	SE 2	SE 3	SW 1	SW 2	W 1	Grand Total
Floodplains [a]															
Area within Floodplain															
Zone A	Acres	1.0	54.4	6.8	19.0	24.4	32.7	19.0	54.4	0.0	54.4	0.0	16.5	15.1	297.7
Zone AE	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zone AH	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zone AO	Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1-percent-annual-chance Subtotal	Acres	*1.0*	*54.4*	*6.8*	*19.0*	*24.4*	*32.7*	*19.0*	*54.4*	*0.0*	*54.4*	*0.0*	*16.5*	*15.1*	*297.7*
Zone X	Acres	608.2	542.5	571.5	707.4	610.4	1188.9	1291.2	400.4	92.6	542.5	92.6	346.6	490.5	7485.1
Total	Acres	*609.3*	*596.9*	*578.3*	*726.4*	*634.8*	*1221.6*	*1310.1*	*454.8*	*92.6*	*596.9*	*92.6*	*363.0*	*505.6*	*7782.8*
Number of Centerline Crossings > 1,000 feet [a]															
Zone A	Number	0	2	0	1	2	3	1	2	0	2	0	1	1	3
Zone AE	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zone AH	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zone AO	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-percent-annual-chance Subtotal	Number	0	2	0	1	2	3	1	2	0	2	0	1	1	3
Zone X	Number	4	5	5	4	4	8	4	5	1	5	1	5	5	24
Total	Number	4	7	5	5	6	11	5	7	1	7	1	6	6	27

Sources: BIA n.d. (a), n.d. (b); Clean Line 2013c, 2013d, 2013e, 2013f, 2013g; DOE 2013a; ESRI 2010, 2012; FEMA n.d., 2013a, 2013b; Koordinates 2006; ODWC n.d., 2011, 2012; USACE n.d.; USDA Forest Service 2003, 2009a, 2009b; USDA NRCS n.d.(a), n.d.(b), 2013a, 2013b; USFWS 2012a, 2012b, 2012c; USGS 2010, 2014; USGS NHD 2012; Ventyx 2013.

Notes:
(a) Within the 200-foot-wide Representative Right-of-Way.
(b) Impervious surfaces account for less than 20% of total cover. Includes large-lot single-family residences, parks, cemeteries, and golf courses.
(c) Impervious surfaces account for 20% to 49% of total cover. Primarily includes single-family residences.
(d) Impervious surfaces account for 50% to 79% of total cover. Primarily includes single-family residences.
(e) Impervious surfaces account for 80% to 100% of total cover. Land uses include higher intensity land uses, such as apartment complexes and commercial and industrial buildings.

Key:
AC = alternating current
kV = kilovolt
USFWS = United States Fish and Wildlife Service
Zone A = Areas subject to inundation by the 1-percent annual-chance flood event generally determined using approximate methodologies.
Zone AE = Areas subject to inundation by the 1-percent annual-chance flood event determined by detailed methods.
Zone AH = Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are 1–3 feet.
Zone AO = Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are 1–3 feet.
Zone X = Zone X may include the following subtypes: 0.2-percent annual-chance flood hazard; area of minimal flood hazard; or, area with reduced flood risk due to levee.

4.2.3.2 Representative ROW E2 of the AC Transmission Line

The representative E2 ROW is 40.0 miles with 83% (33.1 miles) of the route paralleling existing linear infrastructure. The primary existing linear corridors that are paralleled by the E2 ROW include:

- OG&E/Xcel Hitchland-to-Woodward 345 kV electrical transmission line.

Predominant land cover includes grassland/herbaceous (59% [568.5 acres]) and cultivated crops (31% [297.7 acres]). The reach of Palo Duro Creek, crossed by the representative ROW of E2, is classified as a major waterbody. Seven 100- or 500-year floodplains more than 1,000 feet in length are crossed by the representative centerline. Approximately 1% (13.3 acres) of the representative ROW of E2 consists of wetlands, and the centerline does not cross any wetlands more than 1,000 feet in length.

4.2.3.3 Representative ROW E3 of the AC Transmission Line

The representative E3 ROW is 40.1 miles with 13% (5.1 miles) of the route paralleling existing linear infrastructure. The primary existing linear corridors that are paralleled by the E3 ROW include:

- An existing natural gas transmission pipeline; and
- Several county roads.

The predominant land cover includes grassland/herbaceous (67% [654.0 acres]); developed, open space (17% [164.8 acres]); and cultivated crops (11% [106.0 acres]). The reach of Palo Duro Creek, crossed by the representative ROW of E3, is classified as a major waterbody. Five 500-year floodplains more than 1,000 feet in length are crossed by the representative centerline. Less than 1% (1.6 acres) of the representative ROW of E3 consists of wetlands, and the centerline does not cross any wetlands more than 1,000 feet in length.

4.2.3.4 Representative ROW NE1 of the AC Transmission Line

The representative NE1 ROW is 29.9 miles with 33% (9.8 miles) of the route paralleling existing linear infrastructure. The primary existing linear corridors that are paralleled by the NE1 ROW include:

- Several county roads.

The predominant land cover includes grassland/herbaceous (39% [286.5 acres]); cultivated crops (34% [243.5 acres]); and developed, open space (20% [148.6 acres]). There are two major waterbodies, the Beaver (North Canadian) River and Coldwater (Frisco) Creek, within the representative NE1 ROW. Five 100- or 500-year floodplains more than1,000 feet in length are crossed by the representative centerline. Less than 1% (0.6 acres) of the representative ROW of NE1 consists of wetlands, and the centerline does not cross any wetlands more than1,000 feet in length.

4.2.3.5 Representative ROW NE2 of the AC Transmission Line

The representative NE2 ROW is 26.2 miles, with 92% (24.0 miles) of the route paralleling existing linear infrastructure. The primary existing linear corridors that are paralleled by the NE2 ROW include:

- Finney-to-Hitchland 345kV electrical transmission line;
- A county road; and
- S.R. 94.

The predominant land cover includes grassland/herbaceous (70% [442.8 acres]); developed, open space (17% [108.2 acres]); and cultivated crops (8% [49.4 acres]). There are two major waterbodies, the Beaver (North Canadian) River and Coldwater (Frisco) Creek within the NE2 representative ROW. Six 100- or 500-year floodplains more than 1,000 feet in length are crossed by the representative centerline.

Approximately 2% (10.0 acres) of the representative ROW of NE2 consists of wetlands, and the centerline does not cross any wetlands more than 1,000 feet in length.

4.2.3.6 Representative ROW NW1 of the AC Transmission Line

The representative NW1 ROW is 51.9 miles with 81% (42.2 miles) of the route paralleling existing linear infrastructure. The primary existing linear corridors that are paralleled by the NW1 ROW include:

- Texas County-to-Moore County115kV electrical transmission line;
- A county road; and
- U.S. Route 412.

The predominant land cover includes grassland/herbaceous (49% [616.1 acres]); developed, open space (42% [524.7 acres]); and cultivated crops (7% [87.9 acres]).

There are two major waterbodies, the Beaver (North Canadian) River and Coldwater Creek, within the NW1 ROW. Eleven 100- or 500-year floodplains more than 1,000 feet in length are crossed by the representative centerline. Less than 1% (1.4 acres) of the representative ROW of NW1 consists of wetlands, and the centerline does not cross any wetlands more than 1,000 feet in length.

4.2.3.7 Representative ROW NW2 of the AC Transmission Line

The representative NW2 ROW is 56.0 miles, with 17% (9.4 miles) of the route paralleling existing linear infrastructure. The primary existing linear corridors that are paralleled by the NW2 ROW include:

- Several county roads.

The predominant land cover includes grassland/herbaceous (46% [626.4 acres]); cultivated crops (30% [413.8 acres]); and developed, open space (21% [287.6 acres]).

Five major waterbodies, Goff Creek, the Beaver (North Canadian) River, and Coldwater (Frisco) Creek, are within the representative NW2 ROW. Five 100- or 500-year floodplains more than 1,000 feet in length are crossed by the representative centerline. Less than 1% (0.8 acres) of the representative ROW of NW2 consists of wetlands, and the centerline does not cross any wetlands more than 1,000 feet in length.

4.2.3.8 Representative ROW SE1 of the AC Transmission Line

The representative SE1 ROW is 40.2 miles with 28% (11.3 miles) of the route paralleling existing linear infrastructure. The primary existing linear corridors that are paralleled by the SE1 ROW include:

- OG&E/Xcel Hitchland-to-Woodward 345kV electrical transmission line; and
- Several county roads.

The predominant land cover includes grassland/herbaceous (52% [508.3 acres]) and cultivated crops (35% [340.3 acres]).

There are no major waterbodies within the representative ROW of SE1. Palo Duro Creek in Texas is within the representative ROW, where the reach of the creek is not classified as a major waterbody. Seven 100- or 500-year floodplains more than 1,000 feet in length are crossed by the representative centerline. Less than 1% (7.5 acres) of the representative ROW of SE1 consists of wetlands, and the centerline does not cross any wetlands more than 1,000 feet in length.

4.2.3.9 Representative ROW SE2 of the AC Transmission Line

The representative SE2 ROW is 13.3 miles, with 87% (11.6 miles) of the route paralleling existing linear infrastructure. The primary existing linear corridors that are paralleled by the SE2 ROW include:

- Finney-to-Hitchland 345kV electrical transmission line; and
- Texas County-to-Spearman 115kV electrical transmission line.

The predominant land cover includes grassland/herbaceous (52% [168.7 acres]) and cultivated crops (40% [130.6 acres]).

There are no major waterbodies or wetlands within the representative ROW of SE2. One 500-year floodplain more than 1,000 feet in length is crossed by the representative centerline. However, the representative ROW of SE2 traverses 3 reservoirs.

4.2.3.10 Representative ROW SE3 of the AC Transmission Line

The representative SE3 ROW is 49.0 miles, with 42% (20.8 miles) of the route paralleling existing linear infrastructure. The primary existing linear corridors that are paralleled by the SE3 ROW include:

- OG&E/Xcel Hitchland-to-Woodward 345 kV electrical transmission line;
- Several county roads.

The predominant land cover includes grassland/herbaceous (47% [561.2 acres]) and cultivated crops (41% [481.7 acres]).

The reach of Palo Duro Creek, crossed by the representative ROW of SE3, is classified as a major waterbody. Seven 100- or 500-year floodplains more than 1,000 feet in length are crossed by the representative centerline. Approximately 1% (13.9 acres) of the representative ROW of SE3 consists of wetlands, and the centerline does not cross any wetlands more than 1,000 feet in length.

4.2.3.11 Representative ROW SW1 of the AC Transmission Line

The representative SW1 ROW is 13.3 miles, with 95% (12.7 miles) of the route paralleling existing linear infrastructure. The primary existing linear corridors that are paralleled by the SW1 ROW include:

- Finney-to-Hitchland 345kV electrical transmission line; and
- Hitchland-to-Porter 345kV electrical transmission line.

Predominant land cover is grassland/herbaceous (96% [310.7 acres]).

There are no major waterbodies or wetlands within the SW1 representative ROW. Coldwater Creek is within the representative ROW at a reach that is not classified as major. One 500-year floodplain more than 1,000 feet in length is crossed by the representative centerline.

4.2.3.12 Representative ROW SW2 of the AC Transmission Line

The representative SW2 ROW is 37.0 miles, with 75% (27.9 miles) of the route paralleling existing linear infrastructure. The primary existing linear corridors that are paralleled by the SW2 ROW include:

- Texas County-to-Moore County 115kV electrical transmission line.

Predominant land cover includes grassland/herbaceous (81% [730.2 acres]) and developed, open space (14% [121.9 acres]).

There is one major waterbody, Coldwater Creek, within the representative ROW. Six 100- or 500-year floodplains more than 1,000 feet in length are crossed by the representative centerline. Less than 1%

(1.3 acres) of the representative ROW of SW2 consists of wetlands, and the centerline does not cross any wetlands more than 1,000 feet in length.

4.2.3.13 Representative ROW W1 of the AC Transmission Line

The representative W1 ROW is 20.8 miles, with 10% (2.1 miles) of the route paralleling existing linear infrastructure. The primary existing linear corridors that are paralleled by the W1 ROW include:

- Several county roads.

Predominant land cover includes grassland/herbaceous (75% [378.0 acres]) and developed, open space (14% [68.9 acres]).

There is one major waterbody, Coldwater Creek, within the representative ROW. Six 100- or 500-year floodplains more than 1,000 feet in length are crossed by the representative centerline. There are no wetlands within the representative W1 ROW.

4.3 Previous Consultations with the USFWS within the Action Area

The USFWS has completed ESA section 7 consultations and has prepared a Biological Opinion (BO) for other projects that had potential effects on species of plants and animals listed pursuant to the ESA, or their designated or proposed critical habitats. Table 4.3-1, “Past Consultations with the USFWS and Effects Determinations for Actions within the Action Area for all Federally Listed and Proposed Species,” provides an overview of projects, species, and effects in the Action Area.

Note: Table 4.3-1 will be finalized based on consultation with the USFWS.

Table 4.3-1
Past Consultations with the USFWS and Effects Determinations for Actions within the Action Area for all Federally Listed and Proposed Species

Project	Type of Project	Location(s)	Species Addressed	Date
Enbridge Pipelines Flanagan South Pipeline	Crude Oil Pipeline	Lincoln Co., OK	American Burying Beetle Indiana Bat	2013
Fayetteville Express Pipeline	Natural Gas Pipeline	Conway Co. to White, Co., AR		2010
Farm Service Agency implementation of CRP	CRP implementation	Lesser prairie-chicken range	Lesser prairie-chicken	2014
Natural Resources Conservation Service’s Lesser Prairie-Chicken Initiative and Associated Procedures, Conservation Practices, and Conservation Measures	Conservation Initiative	Lesser prairie-chicken range	Lesser prairie-chicken	2014
DOE and Southwestern Power Administration Transmission System	Routine and emergency operational maintenance, and new construction activities of their transmission lines, substations, communications and maintenance facilities, and associated roads	State of Oklahoma	American burying beetle	2010

5.0 Species Evaluations

This section provides detailed evaluations of those species identified by the USFWS (2013, 2014) as endangered, threatened, candidate, or proposed under the ESA that are known to or believed to occur in Project counties. Clean Line considered all species identified in these USFWS correspondence letters; however, after further review of the best available science, some species were determined to not occur in the Project's vicinity and did not receive full, written evaluations. The rationales for excluding these five species from full evaluation are described in their assigned subsections: Fanshell (5.5), Neosho Mucket (5.7), Ozark Cavefish (5.16), Yellowcheek Darter (5.18), and Florida Panther (5.20).

For each species receiving full consideration, the evaluations include a description of natural history relevant to the Project, population status, current threats, potential presence in the Action Area, direct and indirect impacts related to the Project, and protection measures proposed by Clean Line. The analysis of project impacts examines the effects of the Project within the identified Action Area for the species. Such Action Area is species-specific and, at a minimum, always includes the project disturbance footprint, but also includes a wider geographic area depending on the nature of the Project's potential impacts in relation to the species. The project disturbance footprint is the edge or limit of proposed ground disturbance for the Project. As an example, the project disturbance footprint of the Representative ROW for the HVDC line is a 200-foot-wide corridor.

Impacts evaluations necessarily include consideration of activities related to Project construction (see Section 2.2, above), Project O&M (see Section 2.3, above), and Project decommissioning (see Section 2.4, above). Collectively, these three phases are referred to herein as 'project activities.' Where consideration of potential impacts relates only to one or more phases of project activity (e.g., solely construction, or solely O&M), specific mention of the phase will be made. Where consideration of potential impacts applies to all phases, collective reference will be made to project activity.

The environmental baseline informing the assessment of potential impacts is specific to each species, and includes the GIS data described in Section 4.1, "Data Sources," the existing conditions described in Section 4.2, "Existing Conditions within the Project Disturbance Footprint Action Area," and the species-specific information set forth in each of the following subsections. Each species' evaluation is concluded with an effects determination and, if a species received a "May Affect, Likely to Adversely Affect" determination, a review of cumulative impacts.

5.1 Geocarpon

The USFWS listed geocarpon (*Geocarpon minimum*) as a threatened species on July 16, 1987 (USFWS 1987). The USFWS has not designated critical habitat so that specific locations of existing populations are not public knowledge, which would potentially increase illegal geocarpon collection and vandalism.

5.1.1 Natural History

Range

Geocarpon historically occurred in Missouri, Arkansas, Louisiana, and Texas. Although the range of this species may appear large, only a few documented extant populations have been found in each state. To date, geocarpon populations have been documented in six Arkansas counties: Sebastian (Arkansas Natural Heritage Commission [ANHC] 2014), Franklin, Cleveland, Clark, Bradley, and Drew (see Figure 5.1-1, "Geocarpon Range in the Vicinity of the Project") (USFWS 2009). A brief summary by county follows:

- Sebastian County – A single population was discovered on Fort Chaffee in April 2014. The population occurs on saline soil prairie. This find is the first county record for the species (ANHC 2014).
- Franklin County – A single, moderately sized population has been found in this county (USFWS 1987). According to the *Recovery Plan for Geocarpon minimum* (USFWS 1993), this population was last observed in 1989. This location has been labeled the Branch Saline Soil Prairie site, in reference to the USGS 7.5 Minute Branch Topographic Quadrangle, within which this population occurs. The population size in 1989 consisted of hundreds of plants scattered within saline soil prairie (USFWS 1993). According to the Recovery Plan, The Branch site is privately owned, and mentioned as an ANHC acquisition project.
- Cleveland County – Two small populations have been found in this county (USFWS 1987). These sites are identified as Kingsland Prairie and New Edinburg Prairie, with very few plants observed at each (USFWS 1993). The Kingsland Prairie site is owned and managed by The Nature Conservancy (USFWS 2009). No information was found regarding the ownership of New Edinburg Prairie.
- Clark County – According to the Plants Database (USDA 2013), a record of occurrence is noted for this county. The Federal Register listing (USFWS 1987), the 1993 Recovery Plan (USFWS 1993), the 2009 5-year Review for this species (USFWS 2009), and the Arkansas Natural Heritage Commission (ANHC) database provide no evidence to support a record of occurrence for this county. For purposes of this evaluation, Clark County has been omitted from the range map and will not be discussed further in this report.
- Bradley and Drew Counties – A large population occurs at the Warren Prairie Natural Area, owned and managed by the ANHC (USFWS 1987) in cooperation with The Nature Conservancy (USFWS 2009). The Warren Prairie Natural Area occurs in portions of both Bradley and Drew Counties, and was added to the state's Natural Area system in 1983, four years prior to the ESA listing of the geocarpon. This Natural Area is described by the state website as containing critical habitat for geocarpon, which uses the term "critical habitat" for descriptive purposes and does not refer to the ESA terminology of designated critical habitat (ANHC 2013).

Only a single population of geocarpon has been discovered in Arkansas after the ESA listing (ANHC 2014). Considering the diminutive size of the species, undocumented populations of geocarpon may occur within Arkansas. There are 34 documented geocarpon populations in Arkansas: 23 occur on private land, 10 occur on state-owned (ANHC) or private conservation group land (e.g., The Nature Conservancy), and one occurs on property under federal jurisdiction (Fort Chaffee) (USFWS 2009).

Life History

The geocarpon is a small plant that is often overlooked. It is a diminutive, succulent, annual plant adapted to bare mineral soils. This species is a member of the Pink Family (Caryophyllaceae) and is the only member of the *Geocarpon* genus. This herb/forb has opposite, sessile leaves that are green or pinkish and grows to a height of about 1.5 inches. In Arkansas, germination begins in March or April and the lifecycle is completed in three to four weeks (USFWS 1987). Flowers have a greenish-red calyx that lack petals and are inconspicuous, growing from the bases of the leaves. The entire plant can exhibit dull purplish color (Steyermark 1963). Populations consist of solitary individuals or small groups, with the largest colonies typically not exceeding about 10 square feet. The fruit, called a capsule, splits into three parts at maturity, releasing numerous seeds measuring less than 0.02 inches in length (USFWS 1987). In Arkansas, geocarpon populations are associated with the Lafe or Wing soil series, which are high in sodium and magnesium (USFWS 1987). Interestingly, the preferred soil conditions may represent historic Pleistocene lakebeds, and blue-green algae (*Nostoc* spp.) populations are commonly associated with this species' habitat (USFWS 1993).

All populations of geocarpon documented in Arkansas are restricted to saline soils in plant communities classified as "saline soil prairies" (USFWS 1993). In these saline prairies, the species occurs in very thinly vegetated, barren areas with a lack of woody plants (USFWS 1993). This species has not been assigned a wetland indicator status (Lichvar et al. 2014) and is, therefore, considered an upland species (non-hydrophyte; Environmental Laboratory 1987).

5.1.2 Population Status

Based on the lack of botanical collection specimens and the small number of observed populations at the time of ESA listing, this plant may have been rare prior to European settlement. Its small size likely resulted in poor detection of populations. At the time of ESA listing, only two states (Missouri and Arkansas) were noted for this species' occurrence. Within these two states, 17 sites containing geocarpon populations were noted (USFWS 1987). According to the Recovery Plan (USFWS 1993), this species has since been found in Louisiana (Winn Parish).

Though individual plants are annual, populations of geocarpon persist for many years by reseeding themselves, with most populations still extant since their discoveries. Population numbers can vary greatly from year to year, based on moisture and other factors. There has been some debate over the problems with establishing new populations and a possible inability to colonize suitable habitat.

This species is not actively expanding within its range. Efforts by state and federal agencies are unsuccessful in increasing the range or current populations of this species. Though infrequent, new county records and population discoveries do occur. The range-wide population status for geocarpon is noted as stable (USFWS 2009). In April 2014, a population of geocarpon was discovered on Fort Chaffee, Sebastian County, Arkansas (ANHC 2014). This is the first population discovered in Sebastian County, and the only Arkansas population occurring on land within federal jurisdiction.

5.1.3 Current Threats

The USFWS has identified the current primary threats to geocarpon as pasture improvement, trampling/grazing, off-road vehicles, invasion of prairie species, and shading and overcrowding by other plants (USFWS 1987). As a monotypic genus, geocarpon is sought by plant collectors for its uniqueness, and the sites are easily accessible (USFWS 1987). Arkansas has no legal mechanism for the protection of this species (USFWS 1987).

Geocarpon is vulnerable due to the small amount of available habitat, its limited range, and its low population numbers at many of the sites. It is also susceptible to inadvertent destruction because of its diminutive size, annual lifecycle, and limited distribution. Variable reproductive success may cause population size to fluctuate from year to year. This species does not germinate every year, possibly due to moisture availability. Geocarpon can withstand little competition from other species, which can shade and overcrowd available habitat (USFWS 1987).

5.1.4 Potential Presence in the Action Area

Definition of the Action Area

The Action Area for the review of impacts on geocarpon is described as the project disturbance footprint on saline soil prairies in Franklin County, Arkansas, where Wing Series soil map units occur.

There is a single Wing Series soil map unit within the Arkansas River Valley in Franklin County that is labeled as Wing silt loam. As defined by the Natural Resources Conservation Service (NRCS), this soil map unit vegetation occurs as idle or native pasture of low value, with native vegetation comprising a sparse savannah type forest of winged elm (*Ulmus alata*), hawthorn (*Crataegus* spp.), blackjack oak (*Quercus marilandica*), and cedar (*Juniperus* spp.), with ground cover of three-awn grasses (*Aristida* spp.) (Soil Survey Staff 2014).

Presence in the Action Area Based on Existing Data

ArcGIS review shows that no land within the project disturbance footprint meets the saline soil prairie requirements for geocarpon. Of the known populations of geocarpon detailed in Section 5.1.1, "Natural History," none occurs within the Project ROW. Furthermore, review of NRCS soil survey data indicates that Wing silt loam soil map units do not occur within the Project ROW. A single Wing silt loam soil map unit does occur approximately 0.3 miles south of the Project ROW and is within the USGS 7.5 Minute Hunt Topographic Quadrangle.

Additional Desktop/Field Analyses

Based on a literature and ArcGIS review of available data there is no need for additional desktop analysis to investigate the potential for impacts on geocarpon. Many populations of geocarpon inhabit areas less than 1/100th of an acre; suitable habitat may occur within the Project ROW, but the scale of desktop and ArcGIS review would be unable to detect it (ANHC 2014). Accordingly, Clean Line will conduct surveys as needed based on consultation (see 5.1.6.2, "Species-specific Measures").

5.1.5 Direct and Indirect Impacts

Direct Mortality/Injury

The Project traverses a single county that contains documented populations of geocarpon. Franklin County contains a single known population located on private property, referred to as the Branch Saline Soil Prairie site. This site occurs on a private cattle pasture within the Arkansas River Valley. This site is south of the Arkansas River within the USGS 7.5 Minute Branch Topographic Quadrangle and is not close enough to be directly or indirectly affected by the Project. According to the USFWS (2013), if the Project avoids habitat modification of saline soil prairie habitat within Franklin County, there should be no effect on known populations of geocarpon. Based on a review of NRCS Wing silt loam soil map units, which are an indicator of saline soil prairies, known or potential habitat for this species is not known to occur within the Project ROW.

Direct mortality/injury is the physical destruction or damage of a plant. Depending on the time of physical damage, the damage may impact the plant's ability to mature, set seed, distribute seed, or overwinter. Geocarpon is an annual plant, with impacts immediately recognized in the succeeding year's population.

Although no known populations of geocarpon occur within the Project ROW, Clean Line will implement EPMs to avoid and/or minimize impacts on geocarpon.

Habitat Loss/Alteration

Habitat loss for geocarpon can only be estimated as the loss, modification, or degradation of an otherwise unknown population of geocarpon within the Project ROW. This would include Project activities within the Project ROW that remove vegetation or otherwise render saline soil prairie unsuitable for sustaining this species. Additionally, if Project activities result in landscape-level hydrology modifications adjacent to populations of geocarpon, such as construction activities that artificially flood saline soil prairie, habitat loss would also occur. The likelihood of impacts on this species associated with Project-related habitat loss or alteration is considered low.

5.1.6 Protection Measures

Clean Line will use a number of measures to avoid or minimize impacts on the geocarpon. These measures include the EPMs outlined in Section 2.5, "Environmental Protection Measures," and species-specific measures. Collectively, the EPMs and species-specific measures are referred to as "Protection Measures."

5.1.6.1 Environmental Protection Measures

According to desktop and ArcGIS analysis, no known populations of geocarpon have been identified to occur within the Project ROW. As such, the following EPMs—general (GE); land use (LU); fish, vegetation, and wildlife (FVW); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on geocarpon, if any undocumented populations occur within the Project ROW.

General EPMs:

- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-9) – Clean Line will avoid and/or minimize damage to drainage features and other improvements such as ditches, culverts, levees, tiles, and terraces; however, if these features or improvements are inadvertently damaged, they will be repaired and or restored.
- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies, and groundwater wells, or as otherwise required by federal, state, or local regulations.
- (GE-27) – Clean Line will minimize compaction of soils and rutting through appropriate use of construction equipment (e.g., low ground pressure equipment and temporary equipment mats).

Land Use EPMs:

- (LU-5) – Clean Line will make reasonable efforts, consistent with design criteria, to accommodate requests from individual landowners to adjust the siting of the ROW on their properties. These adjustments may include consideration of routes along or parallel to existing divisions of land (e.g., agricultural fields and parcel boundaries) and existing compatible linear infrastructure (e.g., roads, transmission lines, and pipelines), with the intent of reducing the impact of the ROW on private properties.

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-2) – Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.

Waters, Wetlands, and Floodplains EPMs:

- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.
- (W-5) – Clean Line will construct access roads to minimize disruption of natural drainage patterns including perennial, intermittent, and ephemeral streams.
- (W-11) – Clean Line will locate and minimize impacts to groundwater wells and springs within the construction ROW.
- (W-14) – Clean Line will ensure that there is no off-site discharge of wastewater from temporary batch plant sites.

5.1.6.2 Species-specific Measures

To Clean Line's knowledge, there are no established species-specific measures for geocarpon. However, because there is a small possibility of encountering the plant during construction, Clean Line proposes to rely on limited field surveys conducted by a qualified botanist and/or soils scientist, in addition to their EPMs, to minimize potential Project impacts on this species. Clean Line will coordinate with the USFWS to determine locations where it is appropriate to conduct field surveys prior to construction.

5.1.7 Effects Determination

Desktop analyses have not identified the presence of geocarpon or its preferred habitat (saline soil prairie) within the Project ROW. To facilitate the review, the Wing silt loam soil map unit was used as a surrogate for determining the presence/absence of saline soil prairie within the Arkansas River Valley in Franklin County. There is no known preferred geocarpon habitat within the Project ROW. However, based on the possibility of impacts on undiscovered populations of geocarpon, field surveys will be planned and conducted prior to construction.

Taking into consideration the proposed Project design as well as the implementation of the aforementioned EPMs and species-specific measures proposed by Clean Line, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project "may affect, but is not likely to adversely affect" the Geocarpon.

The geocarpon does not currently have designated critical habitat; therefore, the Project "will not destroy or adversely modify" critical habitat for the species.

5.2 Pondberry

Pondberry (*Lindera melissifolia*) was listed as an endangered species by the USFWS on September 2, 1986 (USFWS 1986). The USFWS has not designated critical habitat so that specific locations of existing populations are not public knowledge, which would potentially increase illegal collection and vandalism of pondberry.

5.2.1 Natural History

Range

Historically, pondberry occurred in Missouri, Arkansas, Louisiana, Mississippi, Alabama, Georgia, Florida, North Carolina, and South Carolina. Although the range of this species may appear large, only a few documented extant populations have been found in each state. To date, pondberry populations have been documented in eight Arkansas counties: Clay, Lawrence, Jackson, Poinsett, Craighead, Woodruff, Crittenden, and Ashley (see Figure 5.2-1, "Pondberry Range in the Vicinity of the Project") (USFWS 2014a). A brief county summary is as follows:

- Clay County – Three populations of pondberry occur in the county, one discovered in 1973, and the remaining two populations discovered in 1977. The 1973 population is correlated with the Stateline Sand Ponds Natural Area, which is owned and managed by the ANHC (2009). This parcel was added to the state Natural Area system in 1994. The Clay County populations discovered in 1977, the locations of which are only available through a USFWS request, were noted as in jeopardy based on habitat alterations (USFWS 1986).
- Lawrence County – Two populations of pondberry have been documented in this county since 1985. One population was noted as being in jeopardy of local extermination by habitat alterations associated with rice fields and drainage ditching. The *Recovery Plan for Pondberry (Lindera melissifolia)* (USFWS 1993) noted that this population has since been lost due to habitat modification/degradation. This information has been provided as it provides an example of how indirect habitat modifications can affect populations of this species. The status of the other population is unknown.
- Jackson County – Nine pondberry populations have been documented within this county. Three populations were discovered in 1985 and the others were discovered after the 1985 ANHC inventory effort (USFWS 1993). Of these populations, one is protected within the Swifton Sand Ponds Natural Area, which is owned and managed by the ANHC (ANHC 2009). This parcel was added to the state Natural Area system in 2008. The locations of the remaining populations noted for this county are only available through a USFWS request.
- Poinsett and Craighead Counties – The largest pondberry population in Arkansas, which is likely range-wide, occurs within the St. Francis Sunken Lands WMA, which includes portions of Poinsett and Craighead counties. The St. Francis Sunken Lands Natural Area, which was added to the state Natural Area system in 2009, is part of this mixed ownership area (ANHC 2009). Other owners include private landowners and the USACE. The USACE regularly floods this area as part of the St. Francis River floodway (USFWS 2014a).
- Crittenden County – A single population of pondberry was documented in this county in 2012 (USFWS 2014a). The population was discovered by the ANHC on the Waponocca National Wildlife Refuge, owned and managed by the USFWS.

- Woodruff County – A single pondberry population was documented in 1985. This population occurs in a wooded depression on private property surrounded by agricultural land (USFWS 1986). The current status of this population is unknown, though it was noted as extant in the *Recovery Plan* (USFWS 1993).
- Ashley County – A single population of pondberry was at one time documented to occur on the Coffee Prairie Natural Area. Surveys conducted in 2010 and 2011 did not locate this population, which is now considered extirpated by the USFWS (USFWS 2014a).

A literature review revealed that several populations of pondberry were discovered after it was listed under the ESA. Though remote, there is some possibility that undocumented populations of pondberry may occur within Arkansas.

Life History

Pondberry is a shade-tolerant woody shrub that is adapted for growth under hydric soil conditions. This species is a member of the Laurel Family (Lauraceae), and is closely related to sassafras (*Sassafras albidum*), redbay (*Persea borbonia*), and spicebush (*Lindera benzoin*), which are also shrub species within the Lauraceae family. This deciduous shrub has alternate green leaves and grows up to 6 feet tall. Flowering occurs from March to early April, prior to leaves emerging. Pondberry plants are dioecious, (male or female) as a plant contains either staminate or pistillate flowers. Flowers are yellow and occur in clusters along the stem. Pondberry is often found growing in small populations due to vegetative reproduction by stolons, which are underground stem extensions. This species has rarely been observed propagating by means of sexual reproduction (seed production and germination), though the seeds are viable and produced annually on mature plants. The mature fruit, technically called a drupe, is described as a bright red fleshy coating enclosing a stony seed, maturing in September – November (Hunter 1995). Pondberry populations are measured by both area and stem count, with many populations containing only several hundred stems (USFWS 1986; USFWS 1993).

Pondberry is aptly named as it is generally associated with wet depressions located within bottomland hardwood forests throughout its range. It is noted to grow in shallow water wetlands that dry in late spring (USFWS 1993). Within Arkansas, this species grows in small depressions or sinks in sandy soils (Hunter 1995). Preferred habitat for pondberry is defined as sand pond habitats and low ridges in hardwood bottomland forest (USFWS 2013). Pondberry is a hydrophyte and therefore is usually found growing in saturated soil conditions (Environmental Laboratory 1987). In support of this, pondberry is listed as a facultative wetland indicator species for wetland delineations within the Atlantic and Gulf Coastal Plain Corps of Engineers Region (Lichvar et al. 2014).

5.2.2 Population Status

Based on the lack of botanical collection specimens and the small number of observed populations at the time of ESA listing, this plant may have been rare prior to European settlement (Chafin 2010). At the time of ESA listing, only 19 populations of pondberry were noted (USFWS 1986). According to the *Recovery Plan*, 36 extant populations of pondberry have been documented within the aforementioned range of this species (USFWS 1993). This increase in populations is largely due to increased conservation efforts by state and federal agencies to locate and preserve existing populations post ESA listing (USFWS 1993).

Clonal colonies of pondberry are long-lived, with most populations extant since their discoveries in the 1970s and 1980s. Individual stems may live for five to seven years. There has been some debate over the problems with establishing new populations and observations of a predominance of male flowering stems. Since male flowering stems alone cannot produce a viable fruit there is concern regarding the lack of seed production at many populations. Clonal reproduction, a form of asexual reproduction, does not increase genetic diversity within the species.

This species is not actively expanding within its range. Efforts by state and federal agencies have been unsuccessful in increasing the range or current populations of this species. The range-wide population status for pondberry is noted as stable to declining (USFWS 2014a). Though infrequent, new county records and population discoveries do occur, with one Arkansas population of pondberry discovered since 1993 (USFWS 2014a). Populations of pondberry occurring within the Waponocca National Wildlife Refuge and St. Francis Sunken Lands WMA (in part) are subject to the provisions of the ESA.

5.2.3 Current Threats

The current primary threats to pondberry have been identified by the USFWS as the continued destruction or modification of habitat. Timber harvesting and bottomland drainage are the most significant habitat alterations adversely impacting this species (USFWS 1986). Landscape level hydrology modifications, such as drainage ditching or artificial flooding also adversely impact the species. The majority of modification of pondberry habitat is attributed to agriculture and timber harvesting (USFWS 1993, 2014b). Other threats to this species include incidental herbicide application and water pollution attributed to adjacent agricultural activities (LDWF 2013).

Timber harvesting on private lands has further jeopardized the species. Logging activities have contributed to the extirpation of five populations, and the decline of four others in Arkansas (USFWS 2014a). The pondberry is vulnerable because the forested habitat it inhabits is subject to timber harvesting and landscape level hydrology changes. Low seed production is characteristic of this species, and preserving clonal populations is important for ensuring the continued survival of this species (USFWS 2014a).

5.2.4 Potential Presence in the Action Area

Definition of the Action Area

The Action Area for the review of impacts on the pondberry is described as the project disturbance footprint on sand pond habitat in Jackson and Poinsett counties, Arkansas. This includes temporary survey and construction ROW, operation and maintenance ROW, and decommissioning ROW. Preferred pondberry habitat is defined as sand pond habitats and low ridges in hardwood bottomland forest. To model this habitat, aerial imagery of the Project ROW was reviewed via ArcGIS along with USFWS National Wetlands Inventory (NWI) data (USFWS 2014a). NWI dataset features listed as PFO [Palustrine, forested, deciduous (Cowardin et al. 1979)] were noted where traversed by the Project ROW. The area of review in Jackson and Poinsett counties is the Mississippi River alluvial plain, which is predominantly tilled agriculture fields. This area was formerly covered by bottomland forests, and the largest population of pondberry in Arkansas occurs within this alluvial plain at the St. Francis Sunken Lands Wildlife Management Area, located in Poinsett County.

Presence in the Action Area Based on Existing Data

There are no known occurrences of pondberry in the Project ROW. The Swifton Sand Ponds Natural Area (Jackson County) and the St. Francis Sunken Lands Wildlife Management Area (Poinsett County) both occur to the north of the Project ROW.

GIS review resulted in identifying 12 NWI features crossed by the Project ROW. These NWI features are defined as deciduous forested wetlands (Cowardin’s classification of PFOs). Each of these features was verified as forested by viewing current aerial imagery where the Project ROW crosses these features. The data are insufficient to conclude whether any of these NWI features represent preferred pondberry habitat at this time. In addition, based primarily on search efforts conducted by the ANHC, it is unlikely that additional populations of pondberry will be found within the Project ROW.

Additional Desktop/Field Analyses

No additional desktop or field surveys are recommended at this time; however, pre-construction surveys would be conducted if preferred pondberry habitat were identified.

5.2.5 Direct and Indirect Impacts

Direct Mortality/Injury

The Project is located within the range of pondberry, and although known populations will be avoided, the Project may traverse potential pondberry habitat in northeastern Arkansas. According to the USFWS (2013), if the Project avoids habitat modification of sand pond habitats and low ridges in hardwood bottomland forest, there should be no effect on pondberry. Direct mortality/injury is defined as the physical destruction or damage of pondberry plants.

Although no known populations of pondberry occur within the Action Area, Clean Line will implement EPMs to avoid and/or minimize impacts on pondberry.

Habitat Loss/Alteration

Habitat loss for pondberry can only be estimated as the loss, alteration, or degradation of an otherwise unknown population of pondberry within the Action Area. Habitat loss may occur during the construction or O&M phases during vegetation clearing or maintenance activities. Similarly, habitat loss may occur indirectly in the unlikely event that fires or accidental chemical spills occur in pondberry habitat. Clean Line would implement a number of EPMs (e.g., GE-3 and FVW-1 in Section 5.2.6.1, "Environmental Protection Measures") to avoid or minimize these potential impacts. The implementation of these protection measures and the lack of known populations of pondberry in the Action Area indicate that the likelihood of impacts on this species associated with Project-related habitat loss or alteration is considered low.

5.2.6 Protection Measures

Clean Line will use a number of measures to avoid or minimize impacts on the pondberry. These measures include the EPMs outlined in Section 2.5, "Environmental Protection Measures," and species-specific measures. Collectively, the EPMs and species-specific measures are referred to as "Protection Measures."

5.2.6.1 Environmental Protection Measures

According to desktop and ArcGIS analysis, no known populations of pondberry have been identified as occurring within the Project ROW. As such, the following EPMs—general (GE); land use (LU); fish, vegetation, and wildlife (FVW); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on pondberry, if any undocumented populations occur within the Project ROW:

General EPMs:

- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.

- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-9) – Clean Line will avoid and/or minimize damage to drainage features and other improvements such as ditches, culverts, levees, tiles, and terraces; however, if these features or improvements are inadvertently damaged, they will be repaired and or restored.
- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies, and groundwater wells, or as otherwise required by federal, state, or local regulations.
- (GE-27) – Clean Line will minimize compaction of soils and rutting through appropriate use of construction equipment (e.g., low ground pressure equipment and temporary equipment mats).

Land Use EPM:

- (LU-5) – Clean Line will make reasonable efforts, consistent with design criteria, to accommodate requests from individual landowners to adjust the siting of the ROW on their properties. These adjustments may include consideration of routes along or parallel to existing divisions of land (e.g., agricultural fields and parcel boundaries) and existing compatible linear infrastructure (e.g., roads, transmission lines, and pipelines), with the intent of reducing the impact of the ROW on private properties.

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-2) – Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.

Waters, Wetlands, and Floodplains EPMs:

- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.
- (W-5) – Clean Line will construct access roads to minimize disruption of natural drainage patterns including perennial, intermittent, and ephemeral streams.
- (W-11) – Clean Line will locate and minimize impacts to groundwater wells and springs within the construction ROW.
- (W-14) – Clean Line will ensure that there is no off-site discharge of wastewater from temporary batch plant sites.

5.2.6.2 Species-specific Measures

To Clean Line's knowledge, there are no established species-specific measures for the pondberry. However, because there is some potential for occurrence, Clean Line proposes to coordinate with the USFWS to determine areas and methods to conduct pre-construction surveys for the pondberry. Pondberry surveys are most appropriately conducted either during the flowering (March through early April) or fruiting (September through October) reproductive stages, when the yellow flowers and red fruits provide strong visual clues for discovery. Additionally, Clean Line will rely on their EPMs to minimize potential Project impacts on this species.

5.2.7 Effects Determination

At this time, desktop analyses have not identified the presence of pondberry or its preferred habitat (sand pond habitats and low ridges in hardwood bottomland forest) within the Project ROW. NWI forested wetlands were interpreted as potentially suitable habitat. A total of 12 NWI deciduous forested wetlands are crossed by the Project ROW within these two counties. Although unlikely, there is a possibility that previously unknown populations could be discovered during pre-construction or construction activities.

Taking into consideration the proposed Project design as well as the implementation of the aforementioned EPMs and species-specific measures proposed by Clean Line, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project "may affect, but is not likely to adversely affect" the pondberry.

The pondberry does not currently have designated critical habitat; therefore, the Project "will not destroy or adversely modify" critical habitat for the species.

5.3 American Burying Beetle

The American burying beetle (ABB) was listed as endangered under the ESA in 1989 (USFWS 1989). The USFWS has not designated critical habitat for the ABB.

5.3.1 Natural History

Range

Historically, the ABB is known to have occurred in 35 states in the central and eastern United States and the southern fringes of Ontario, Quebec, and Nova Scotia, Canada (USFWS 2008, 2013a; NatureServe 2013). The ABB's current known range is limited to portions of South Dakota, Nebraska, Kansas, Oklahoma, Arkansas, Texas, and Rhode Island (USFWS 2008, 2013, 2014a; NatureServe 2013). The Rhode Island population inhabits Block Island National Wildlife Refuge and is the only known natural population remaining east of the Mississippi River (USFWS 1989; NatureServe 2013). The USFWS has introduced an experimental, non-essential population at Wah'Kon-tah Prairie in southwest Missouri (USFWS 2014a). Similarly, reintroductions have been attempted in Perry County, Ohio and Penikese and Nantucket Islands in Massachusetts (NatureServe 2013; USFWS 2013a; USDA 2014). Section 5.3.4, "Potential Presence in the Action Area," below describes the ABB's range relevant to the Project in more detail.

Habitat

Favorable habitat for ABBs is not defined in terms of vegetation structure and plant species composition but rather by the presence of suitable carrion, competitors, and adequate soil (Holloway and Schnell 1997; USFWS 2008, 2013a). ABBs may prefer forests but are documented in a variety of habitat types that also include shrublands, grasslands, and forest edges (Lomolino et al. 1995; Lomolino and Creighton 1996; USFWS 2008; Khetani and Parker 2011; NatureServe 2013; New York State Department of Environmental Conservation [NYSDEC] 2013). Their preference for mature forests may be attributed to the forests having increased litter layers, less compacted soils, and less competition from vertebrate scavengers (Lomolino and Creighton 1996; USFWS 2008). Habitat generalism allows ABBs to have larger home ranges in which to search for suitable carrion for reproduction (Lomolino et al. 1995; USFWS 2008). ABBs are, however, less likely to be associated with habitats that are more disturbed by human activities because disturbed habitats favor avian and mammalian competitors and reduce the carrion prey base (Sikes and Raithel 2002; USFWS 2008; Khetani and Parker 2011; USFWS 2013a).

Vertebrate densities and species composition are key factors in determining favorable habitat for ABBs (Holloway and Schnell 1997; USFWS 2008). Holloway and Schnell (1997) found significant positive correlations between the occurrence of ABBs and the biomass of mammals and birds, mammal abundance, and mammal species richness (USFWS 2008). They determined that ABBs prefer sites with an abundance of small vertebrates (especially mammals) and suitable soils for carcass burial and brood-rearing, regardless of vegetation characteristics. Competitors also are an important component of the vertebrate densities and species composition that influence ABB presence. Human-modified and fragmented habitats are favorable to many vertebrate scavengers that compete with ABBs for carrion, including American crows (*Corvus brachyrhynchos*), raccoons (*Procyon lotor*), Virginia opossums (*Didelphis virginiana*), coyotes (*Canis latrans*), and foxes (Sikes and Raithel 2002; Way and Eatough 2006; Kays, Gompper, and Ray 2008; USFWS 2008; NatureServe 2013). Invertebrate species, particularly ants, may also be strong competitors with ABBs (Scott, Traniello, and Fetherston 1987; USFWS 2008).

Feeding

ABBs are scavengers that primarily feed on carcasses of mammals and birds that weigh from 3 to 11 ounces (Lomolino et al. 1995; USFWS 2008; NatureServe 2013; NYDEC 2013). The Block Island population, for example, feeds on the abundant carcasses of several bird species, including ring-necked pheasant (*Phasianus colchicus*) chicks and American woodcock (*Scolopax minor*) (NatureServe 2013; NYDEC 2013). The species is, however, attracted to carrion of all major vertebrate classes, including reptiles, amphibians, and fish (Bedick, Ratcliffe, and Higley 2004; USFWS 2008). They are opportunistic scavengers and will also feed on decaying vegetation, and occasionally capture and kill other insects (NatureServe 2013; NYDEC 2013). ABBs are the largest carrion beetle in their ecological communities and require larger carcasses than other species (Lomolino et al. 1995; USFWS 2008).

Breeding

ABBs are active from April through September (NatureServe 2013; NYDEC 2013). Reproduction depends upon the availability of carrion and may occur throughout the active period, but reproduction peaks in June and July. ABBs are active nocturnally when the air temperature exceeds approximately 60°F. ABBs use olfactory organs in their antennae to locate carcasses up to 2 miles away (Khetani and Parker 2011; USFWS 2013a,) and males may broadcast pheromones to attract females to carcasses (Khetani and Parker 2011; NYDEC 2013). A number of males and females may be attracted to a single carcass and compete until one male/female pair remains on the carcass, typically the largest (USFWS 1989; Khetani and Parker 2011; NYSDEC 2013).

The dominant pair then buries the carcass or may relocate it first, to a substrate more conducive to burial (USFWS 1989, 2013a; NYDEC 2013). Carcasses may weigh up to 200 times the weight of the ABB (NYDEC 2013). The beetles move the carcass by lying on their backs beneath it and moving it along with their legs. The ABB pair buries the carcass by digging a hole several inches deep (USFWS 2013a). The beetles remove the fur or feathers and then secrete a substance that retards the decomposition of the carcass. The female also excavates a small brood chamber adjacent to the carcass as it is being buried. The entire carcass burial process is typically completed in one night (NatureServe 2013; NYSDEC 2013; USFWS 2013a).

The female ABB lays approximately 10 to 30 eggs in the brood chamber, and the larvae hatch within a few days (Khetani and Parker 2011; NYSDEC 2013; USFWS 2013a). Both adults regurgitate food for the larvae until they are able to feed themselves. If the carcass is not large enough to support the brood, the adults may cannibalize some of the smaller larvae (Khetani and Parker 2011; USFWS 2013a). The adults regularly maintain the carcass, removing fungi and coating it with an antibacterial secretion (USFWS 2013a). The larvae feed on the carcass for approximately one week until they have consumed all but the bones (Khetani and Parker 2011; NYDEC 2013; USFWS 2013a). At this point, the adults depart and the brood disperses to pupate in the nearby soil. The adults live one year only and die after reproduction or during the subsequent winter. The young emerge from pupation approximately 48 to 68 days after hatching, beginning the adult stage of the life cycle. ABBs overwinter in the adult stage (USFWS 2013a).

Overwintering

ABBs seek carrion after they have emerged from their pupal stage during the fall. Newly emerged adults are dormant during the winter (approximately September to April), burying themselves up to 6 inches beneath the surface of the ground (Schnell et al. 2008; USFWS 2008). The availability of carrion benefits the survival of the overwintering adults. Schnell et al. (2008) found that 77% of individuals with access to carrion in the fall survived the winter, as opposed to 45% survival for those without access to carrion (USFWS 2008). The mean survival rate for ABBs with and without access to carrion was approximately 60%.

5.3.2 Population Status

ABBs have been extirpated from 90% of their historic range, which included 35 states and the fringes of three Canadian provinces (USFWS 2008, 2013a; NatureServe 2013). They are now known to occur in portions of seven states, with reintroduction efforts ongoing in three more states (see the "Range" paragraph in Section 5.3.1, "Natural History"). Since its listing, ABB inventory and monitoring efforts have increased, particularly in the states where populations have now been identified. Reliable methods for estimating population sizes remain absent, and trapping numbers vary annually (USFWS 2008). However, one of the more closely monitored populations (Block Island) has shown increases in trap rates over time. The Block Island population is estimated to consist of 1,000 to 2,000 individuals (USFWS 2008, 2013a). Populations in other states are of uncertain size, although South Dakota's population is believed to be of high density and covers approximately 500 square miles (USFWS 2013a).

5.3.3 Current Threats

A combination of factors may present threats to the continued existence of the ABB; however, habitat loss and modification likely present the biggest threats. The continued development of native habitats, as well as fire suppression, has isolated preferred habitats, disrupting connectivity between populations (USFWS 2008). Soil compaction associated with land development may also limit available habitat for successful reproduction and overwintering (Sikes and Raithel 2002). Loss and modification of habitats also has potential negative effects on the composition and density of vertebrate species that may serve as carrion for ABB (Sikes and Raithel 2002; USFWS 2008, 2013a). Similarly, fragmenting habitats increase habitat edges, which benefit several vertebrate competitors of ABB for appropriately sized carrion (Sikes and Raithel 2002; Way and Eatough 2006; Kays, Gompper, and Ray 2008; NatureServe 2013; USFWS 2008, 2013a).

Competition from invertebrate scavengers, particularly red imported fire ants (*Solenopsis wagneri*), also may pose a threat to ABB populations (USFWS 2008). Red imported fire ants have come to infest nearly 300 million acres in the southeast United States since their introduction to the country in the 1930s. Fire ants may be a potential source of mortality for ABB as well, although predation by fire ants or any potential predator is not considered a notable threat to the ABB. Fire ants also may be reducing the populations of ground-nesting birds, a potential source of ABB carrion. The continuing spread of fire ants throughout the southeast United States and beyond could also make ABB conservation efforts difficult.

Artificial lighting has been indicated as a possible, albeit minor, threat to the nocturnal ABB (Sikes and Raithel 2002). Evidence is largely circumstantial and may be derived from the fact that most extant populations of ABB occur in remote, relatively lightless areas, and the beginning of their decline in the late nineteenth century is concurrent with electric lighting becoming widespread. Other proposed hypothetical threats include disease, predation, and pesticides, none of which are supported by existing data.

5.3.4 Potential Presence in the Action Area

Definition of the Action Area

The USFWS (2014b) considers the presence of ABBs within 0.5 miles of Project actions when determining impacts on the species and has identified 0.5 miles as the effective radius of an ABB presence/absence survey, according to their survey guidance document (USFWS 2014c). The USFWS (2014c) "determined the effective survey radius based on the ABB's mobility, size, recorded movement distances, and the distance from which ABBs can detect carrion." As such, the Action Area for the ABB is considered to be the project disturbance footprint plus a 0.5-mile buffer where the Project traverses ABB habitat, as identified by desktop and field analyses, between Lincoln County, Oklahoma and Johnson County, Arkansas (see "Additional Desktop/Field Analyses" below).

Presence in the Action Area Based on Existing Data

The ABB's current range includes 43 counties in Oklahoma and five in Arkansas (see Figure 5.3-1, "Potential Presence of American Burying Beetle in the Action Area") (USFWS 2014a, 2014b). The Project would traverse six counties in the ABB's current range in Oklahoma (Payne, Lincoln, Creek, Okmulgee, Muskogee, and Sequoyah) and Franklin County in Arkansas (USFWS 2014b). Additionally, the USFWS indicated in their May 2013 (USFWS 2013b) and April 2014 (USFWS 2014d) letters that ABB could occur in Crawford and Johnson Counties, Arkansas. The Project also traverses Conservation Priority Areas identified by the USFWS (USFWS 2014b) in Oklahoma. Conservation Priority Areas are defined as "areas where conservation efforts should be focused and where higher ratios of mitigation for impacts to ABBs should occur" (USFWS 2014b). The Project traverses Conservation Priority Areas in Muskogee and Sequoyah Counties.

There are two publicly identified ABB populations in the vicinity of the Project. Camp Gruber sits approximately 7 miles north of the Project in Muskogee County, Oklahoma, and Fort Chaffee is approximately 15 miles south of the Project in Crawford County, Arkansas (see Figure 5.3-1, "Potential Presence of American Burying Beetle in the Action Area") (USFWS 2008). Additionally, the USFWS' (2014e) Oklahoma Ecological Services Field Office published ABB location data resulting from presence/absence surveys conducted in Kansas, Oklahoma, and Texas from 2012 to 2014. Clean Line reviewed these data and determined that one survey location occurred in the Action Area. The single survey location, which is located approximately 0.48 miles north of the 200-foot HVDC ROW in Okmulgee County, Oklahoma, yielded positive detection of ABBs in 2013 (see Figure 5.3-1, "Potential Presence of American Burying Beetle in the Action Area").

Additional Desktop/Field Analyses

Clean Line commissioned a study of favorable ABB habitat in the 200-foot HVDC ROW and a wider 1,200-foot corridor where the Project traverses the ABB's range. The study included a desktop analysis to determine favorable and unfavorable habitats based on criteria considered by the USFWS (2014c) to identify areas unfavorable to the ABB. The predictive value of this desktop analysis was verified through aerial imagery and field verification of randomly selected locations. To determine the potential need for pre-construction presence/absence surveys, the 200-foot HVDC ROW was divided into 1-mile segments, as each potential survey unit has a functional trapping diameter of 1 mile. (See the "Desktop Assessment of Habitat Suitability for the American Burying Beetle [*Nicrophorus americanus*] for Clean Line Energy Partners, LLC" in Appendix C for complete details about the purpose and methods of this study.)

The Project traverses 209 miles of ABB range in Oklahoma and Arkansas. Of the 209 1-mile survey units, nine were composed of 100 percent unfavorable habitat and would not require pre-construction presence/absence surveys. The remaining 200 survey units are a mosaic of favorable and unfavorable habitats. In fact, 50.5 percent of the 200-foot study corridor and 50.3 percent of the 1,200-foot study corridor were identified as unfavorable ABB habitats. Of the 200 survey units containing favorable habitat, 39 units are within Conservation Priority Areas in Muskogee and Sequoyah Counties, Oklahoma. Refer to the "Desktop Assessment of Habitat Suitability for the American Burying Beetle (*Nicrophorus americanus*) for Clean Line Energy Partners, LLC" in Appendix C for complete details about the results of this study, including maps and photographs.

5.3.5 Direct and Indirect Impacts

Direct Mortality/Injury

ABBs are sedentary or less mobile while overwintering and during reproduction. During these periods, they are typically buried only a few inches beneath the ground surface and would be susceptible to direct mortality from foot traffic, construction vehicles, and/or clearing, grading, and excavating equipment. In the ABB habitat assessment (see Appendix C) commissioned by Clean Line, nearly 50 percent of the study areas (200-foot and 1,200-foot corridors centered on the HVDC transmission line in ABB range) were deemed favorable habitat and ABB presence was assumed. Pending pre-construction presence/absence surveys, Project activities in all of these favorable habitat areas present a risk of ABB mortality during all phases of the Project. Impacts are most likely to occur during construction because personnel and equipment would be present in greater numbers and more ground disturbance would occur. Impacts would be expected to be short-term, although these impacts could have longer-term effects if a large number of mortalities occurred relative to the size of the local population. Clean Line will implement a number of protection measures (see Section 5.3.6, "Protection Measures"), e.g., GE-20, to reduce the potential for ABB mortalities associated with Project activities.

Herbicides used for weed control, as well as fuel or other chemical spills, could cause mortality of individuals that come in direct contact with the spill. However, Clean Line will keep emergency and spill response equipment available during all Project activities so that spills, should they occur, will be promptly contained, thus reducing potential adverse effects on ABBs (see GE-13 in Section 5.3.6.1, "Environmental Protection Measures"). Similarly, accidental fires caused by construction personnel or equipment, depending on their severity, may cause direct mortality of ABBs. Keeping equipment in good working order (GE-21 in Section 5.3.6.1, "Environmental Protection Measures") and turning off idling equipment would reduce the possibility of igniting fires.

Sensory Disturbance

If night construction activities were required, artificial lighting could have direct impacts on ABBs by decreasing nocturnal activity (Sikes and Raithel 2002; USFWS 2013a). Night lighting impacts would be short-term, lasting only as long as night work occurs in a specific area. As indicated, Clean Line will conduct construction activities during daylight hours to the extent practicable (see GE-20 in Section 5.3.6.1, "Environmental Protection Measures"). If night construction is necessary, Clean Line will adhere to the species-specific measures outlined in Section 5.3.6.2, "Species-specific Measures," to avoid or minimize impacts. Currently, ABB presence is assumed in nearly 50% of the 200-foot Project ROW, based on the results of the "Desktop Assessment of Habitat Suitability for the American Burying Beetle (*Nicrophorus americanus*) for Clean Line Energy Partners, LLC" (see Appendix C). The results of pre-construction presence/absence surveys in favorable habitats would likely reduce the percentage of occupied habitat and, thus, the potential impacts associated with night-lighting.

Habitat Loss/Alteration

Potential indirect impacts on ABBs would be largely due to habitat loss and/or fragmentation. Fragmentation alters species composition of beetle habitat and could lower the reproductive success of their targeted prey. Fragmentation also increases edge habitat, which, in turn, supports a greater density of vertebrate scavengers (e.g., crows, raccoons, foxes, opossums, etc.) that compete for carrion (Sikes and Raithel 2002; Way and Eatough 2006; Kays, Gompper, and Ray 2008; USFWS 2008, 2013a). Habitat loss and fragmentation may also isolate preferred habitat patches. Similarly, soils compacted by Project equipment may no longer be favorable for burying during reproduction and overwintering. Currently, ABB presence is assumed in nearly 50 percent of the 200-foot Project ROW, based on the results of the "Desktop Assessment of Habitat Suitability for the American Burying Beetle (*Nicrophorus americanus*) for Clean Line Energy Partners, LLC" (Appendix C). The results of pre-construction presence/absence surveys in favorable habitats would likely reduce the percentage of occupied habitat in the project disturbance footprint (i.e., 200-foot HVDC ROW). This, in turn, would reduce the potential Project-related impacts associated with habitat loss and fragmentation relative to the time of this document's preparation. Impacts related to habitat alteration or removal would be short term where habitat is restored within five years (defined for short-term impacts). Impacts would be long term where trees will be removed in forested ROW, which would require longer than five years to restore to pre-construction conditions, and where permanent structures are constructed in favorable habitat.

Increased Competition

Vertebrate scavengers, and thus competition with ABBs, may increase due to factors such as habitat alteration and trash. Trash created by Project personnel, particularly during construction, can attract scavengers like crows and raccoons. This would be a short-term impact that would end with the removal of the trash source, in addition to being addressed below. A longer-term impact would result from the creation of edge habitats, which also can attract scavengers. Increased edge habitat can also facilitate movement and improve hunting efficiency for some predators and scavengers. In forests, for example, coyotes are most abundant in areas of disturbance (Kays, Gompper, and Ray 2008). Coyotes are also known to travel extensive distances on linear pathways, including transmission line ROWs (Way and Eatough 2006).

5.3.6 Protection Measures

Clean Line has agreed to a number of measures to avoid or minimize impacts on ABBs. These measures include the Clean Line-designated EPMs outlined in Section 2.5, "Environmental Protection Measures," and species-specific measures described in *Best Management Practices for the American Burying Beetle (ABB) in Oklahoma* (USFWS 2014b). Collectively, the EPMs and species-specific measures are referred to as "Protection Measures."

5.3.6.1 Environmental Protection Measures

The following EPMs—general (GE) and fish, vegetation, and wildlife (FVW)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on ABBs.

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety, and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits.
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-4) – Vegetation removed during clearing will be disposed of according to federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to pre-construction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.

- (GE-20) – Clean Line will conduct construction and scheduled maintenance activities on the facilities during daylight hours, except in rare circumstances that may include, for example, to address emergency or unsafe situations, to avoid adverse environmental effects, to minimize traffic disruptions, or to comply with regulatory or permit requirements.
- (GE-21) – Clean Line will maintain construction equipment in good working order. Equipment and vehicles that show excessive emissions of exhaust gasses and particulates due to poor engine adjustments or other inefficient operating conditions will be repaired or adjusted.
- (GE-22) – Clean Line will impose speed limits during construction for access roads (e.g., to reduce dust emissions, for safety reasons, and for protection of wildlife).
- (GE-25) – Clean Line will turn off idling equipment when not in use.
- (GE-27) – Clean Line will minimize compaction of soils and rutting through appropriate use of construction equipment (e.g., low ground pressure equipment and temporary equipment mats).

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-2) – Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.

5.3.6.2 Species-specific Measures

In addition to the EPMs (see Section 5.3.6.1, "Environmental Protection Measures"), if take cannot be avoided, Clean Line will address such impacts with habitat offsets to assist in ABB recovery efforts (USFWS 2014b). The USFWS would recommend the Project conserve an amount of land proportional to the impacts on ABB habitat resulting from Project actions. Refer to Appendix B in *Mitigation Recommendations for the American Burying Beetle (ABB) in Oklahoma* (USFWS 2014b) for ratios for habitat offsets.

5.3.7 Effects Determination

The *American Burying Beetle Impact Assessment for Project Reviews* (USFWS 2014b) includes a series of steps to be used by proponents to derive an effects determination based on the potential impacts of their project on ABBs. The Project has a federal nexus and portions of the Project occur within ABB range as defined by the USFWS (2014b). The "Desktop Assessment of Habitat Suitability for the American Burying Beetle (*Nicrophorus americanus*) for Clean Line Energy Partners, LLC" (Appendix C) determined that portions of the Action Area may contain habitat that is favorable for use by the ABB. The presence of favorable habitat triggers the need for valid presence/absence surveys according to the

USFWS (2014c) protocols. Negative results of presence/absence surveys in all favorable habitat would result in a "may affect, not likely to adversely affect" determination; however, the Project will assume the presence of ABBs in all favorable habitat and conduct presence/absence surveys prior to construction to refine the areas occupied by ABBs in the Action Area. Regardless of the decision to assume presence at this time, there is a valid, positive ABB survey in the Action Area in Okmulgee County, Oklahoma, which would automatically trigger the next step in the process (USFWS 2014b, 2014e). The final step, in the USFWS (2014b) process asks whether the Project actions will include "soil disturbance, use of vehicles or heavy equipment, artificial lighting, vegetation removal, use of herbicides, pesticides, other hazardous chemicals, OR any activity that may impact soil or vegetation or otherwise harm ABBs." The Project will include several of these actions in favorable ABB habitat that is assumed to be occupied; therefore, the Project "may affect, and is likely to adversely affect" the ABB.

The ABB does not currently have designated critical habitat; therefore, the Project "will not destroy or adversely modify" critical habitat for the species.

5.3.8 Cumulative Effects

In light of the determination that the ABB is likely to be adversely affected by the Project, the cumulative effects of non-Project-related future activities on ABBs are described below. This section considers future state, local, tribal, and private actions, not involving federal activities, that are reasonably certain to occur within the ABB Action Area.

The following non-federal activities have been identified as reasonably certain to occur within the ABB Action Area:

- ***State Highway (SH)-99 in Northeast Corner of Lincoln County, Oklahoma.*** Oklahoma Department of Transportation (ODOT 2013) plans for a bridge and approaches on SH-99 at Sand Creek. The project disturbance footprint lies about 0.2 mile south of the Sand Creek Bridge. This activity may result in some vegetation clearing/maintenance, but potential impacts on ABBs in the Action Area would largely be associated with temporary disturbances from crews and equipment during construction.
- ***United States Highway (US)-62, Northwest Corner of Muskogee County, Oklahoma.*** ODOT (2013) plans a bridge and approaches activity on US-62 at Cane Creek about 1.3 miles south of where US-62 joins SH-72 and turns south. The project disturbance footprint would traverse US-62 about 0.1 mile north of this activity. This activity may result in some vegetation clearing/maintenance, but potential impacts on ABBs in the Action Area would largely be associated with temporary disturbances from crews and equipment during construction.
- ***The Arkansas State Highway and Transportation Department (AHTD) District 4, Crawford County, Arkansas.*** The AHTD (2012, 2014) has plans for programmed work on Interstate (I)-40 from the Oklahoma-Arkansas state line to an area west of Dyer, and has plans for new construction of US-71 from Alma south to an area east of Kibler, and to the Arkansas River southeast of Fort Smith. The project disturbance footprint would traverse both of these activity segments. The new construction activities may result in some vegetation clearing/maintenance, which may result in impacts on ABBs and favorable habitat. Similarly, potential impacts on ABBs in the Action Area may also occur during construction for the I-40 work and new construction and would largely be associated with temporary disturbances from crews and equipment.

5.4 Curtis Pearlymussel

The USFWS listed the Curtis pearlymussel (*Epioblasma florentina curtisii*) as endangered on June 14, 1976 (USFWS 1976). Critical habitat has not been designated for the Curtis pearlymussel.

5.4.1 Natural History

Range

Historically, the Curtis pearlymussel occurred in the White and St. Francis River basins in southern Missouri and northern Arkansas; Spring River, a tributary of the Black River, in Arkansas; and the Black River in Missouri in Wayne and Butler Counties (USFWS 1986). In the last 30 years, the Curtis pearlymussel occurred in Fulton County, Arkansas, and Ripley and Wayne Counties, Missouri (see Figure 5.4-1, "Potential Presence of Curtis Pearlymussel in the Action Area") (USFWS 1986, 2014). It is possible that the Curtis pearlymussel has been extirpated from Lawrence and Randolph Counties, Arkansas, and Bollinger County, Missouri (NatureServe 2014).

Based on 1986 surveys, the Curtis pearlymussel was in Missouri only in 6.1 miles of the upper Little Black River, and 7 miles of the Castor River upstream from the Headwater Diversion Channel, with the Black River population being the largest (USFWS 1986). However, exhaustive surveys between 2004 and 2007 failed to find any Curtis pearlymussel in any areas previously known to have populations (USFWS 2010). In Arkansas, the Curtis pearlymussel was from four localities: two in the South Fork Spring River, one in the Spring River, and one in the Black River (Harris, Farris, and Christian 2007). Between 1996 and 2006, mussel surveys also failed to detect the presence of Curtis pearlymussel in 11 sampled rivers and creeks covering 550 stream miles and sampling 276 sites.

Habitat

The Curtis pearlymussel occurs in transitional zones between lowland and headwater stream sections that are relatively silt-free (USFWS 1986, 2014). This species prefers riffles or runs that are between the faster headwater sections and the slower meandering currents further downstream. The Curtis pearlymussel uses suitable substrates ranging in size from sand to gravel, and positioning itself among cobble and boulders, usually in water between 2 and 30 inches deep.

Breeding

The Curtis pearlymussel is a bradytictic spawner. Like all freshwater mussel species, the Curtis pearlymussel begins life in a larval phase known as a glochidium (plural: glochidia). This phase lasts throughout the winter until the following spring or summer (Baldridge, Christian, and Peck 2007). During the glochidial phase, the Curtis pearlymussel attaches to the gills of the host fish before developing into a shelled juvenile mussel. The rainbow darter (*Etheostoma caeruleum*) is a suitable host for the Curtis pearlymussel (USFWS 1986). Other darter species may also be suitable hosts, but it would require laboratory transformation studies to confirm that the rainbow darter or any other fish is the host of the Curtis pearlymussel (USFWS 2010).

The Curtis pearlymussel is unique compared to other freshwater mussel species in that its natural population is dominated by males with a sex ratio of typically 7:1 (NatureServe 2014). During much of the year, Curtis pearlymussels remain buried in their substrate and are difficult to find. However, during March and April, female Curtis pearlymussels can be found lying on their sides above the substrate, releasing glochidia (USFWS 1986).

Feeding

Like most freshwater mussels, the Curtis pearlymussel is a filter feeder. Freshwater mussels have gills modified to trap food particles (algal detritus and/or microorganisms) that are in the water column and move with the current (Ruppert and Barnes 1994). The gills have multiple filaments and cilia that aid in trapping and transporting food materials back to the digestive organs. Siphons are exposed above the burrow location, and play a role in the feeding process as well.

Locomotion

The Curtis pearlymussel, like most freshwater mussels, has a compressed, blade-like muscle, known as a "foot," that is used for movement (Ruppert and Barnes 1994). All freshwater mussels use their foot, along with a variety of other muscles within their shell cavity, to move through their environment. Most species use these mussels to burrow down into a preferred substrate. The Curtis pearlymussel prefers silt-free sand and gravel substrate, but also gravel to cobble to burrow down into, exposing just the shell edge and water siphons to the water column (USFWS 1986). In most instances, the only movements made by freshwater mussels are vertical motions to adjust the position within the substrate burrow (Smith 2013). These vertical movements are typically in response to environmental stimuli correlated to feeding or breeding to make sure the mussel's position in the substrate allows it to access the water column (USFWS 1997). Small migrations of freshwater mussels like the Curtis pearlymussel are possible, but on a small scale (i.e., short distances and short time-frames) and would be a result of habitats becoming unsuitable through changes in water level, sedimentation regiments, reduction of food availability, or introduction of contaminants (USDA NRCS 2007).

5.4.2 Population Status

Habitat availability is a limiting factor for the Curtis pearlymussel, compounded by the drastic amount of habitat loss from riverine developments over the last century (USFWS 1986). This species requires flowing riffles in shallow water and is intolerant of pollution. Much of the Curtis pearlymussel's historical habitat has been altered by various stream impoundments that have inundated stream stretches with raised water levels to support flood control, hydropower production, and recreation; thus, destroying its preferred habitat.

In 1993, the last known living individual Curtis pearlymussel (single male) was observed during a search that totaled 100 survey-hours (USFWS 2010). After numerous mussel surveys between 2004 and 2007, 40 sites in Missouri and 56 sites in Arkansas found no evidence of the Curtis pearlymussel. It is believed that the last remaining Curtis pearlymussel population declined over the last 20 years to the point that the species is no longer detectable unless an unknown population exists (USFWS 2010). However, the USFWS 5-Year Review of Curtis Pearlymussel (USFWS 2010) stated that this species should not be considered extinct because suitable habitat still exists and not enough time has elapsed since its disappearance.

5.4.3 Current Threats

Alteration, degradation, and destruction of habitat are the most serious threats to the Curtis pearlymussel (USFWS 1986, 2010, 2014; Missouri Department of Conservation [MDC] 2000). Primary habitat threats include waterbody impoundments (e.g., dams) and channelization related to flood control and navigation (e.g., dredging). Construction of dams, dredging, and channelization can cause physical removal of individuals from habitat, inundate and destabilize habitats, and change flow regimes. Other threats include general water quality degradation from non-point and point pollution sources, invasive species competition (e.g., zebra mussels, Asian clam), and climate change.

5.4.4 Potential Presence in the Action Area

Definition of the Action Area

The project disturbance footprint is outside the range of the last known populations of Curtis pearlymussel in Arkansas occurring in Fulton, Lawrence, and Randolph Counties (NatureServe 2014). In their April 2, 2014 clarification letter, the USFWS identified the Curtis Pearlymussel as a species that may occur in Jackson County, Arkansas; however, based on the most recent survey data this species is believed to be extirpated from Arkansas.

Presence in the Action Area Based on Existing Data

Historically, the Curtis pearlymussel was known from Spring River and South Fork Spring River, and a questionable record from Black River, in Arkansas (USFWS 2010). Some of these older records have been questioned. The most recent observation of any Curtis pearlymussel from Arkansas was recently dead specimens (2 female, 1 male) from Spring River above the confluence with Black River. However, the accurate identification of these individuals remains uncertain and is "considered questionable" by Harris, Farris, and Christian (2007). Furthermore, exhaustive surveys in Arkansas between 1996 and 2006 failed to locate any Curtis pearlymussel after sampling 276 sites across 11 streams and rivers (Harris, Farris, and Christian 2007). However, absence does not indicate that this species has been definitively extirpated from its Arkansas range, thus the following impacts discussion is provided.

5.4.5 Direct and Indirect Impacts

Direct Mortality/Injury

Clean Line will avoid in-stream work. If in-stream work is necessary, potential activities during construction may include excavation or travel through water, which could result in individual mussels being crushed or buried by equipment or personnel. If in-stream work (within the Action Area) is required during construction, Clean Line would coordinate with the USFWS and the appropriate state resource management agencies to determine the need for pre-construction surveys and to identify site-specific measures to avoid or minimize impacts at occupied crossings (see FVW-5 in Section 5.4.6, "Protection Measures").

Spills of hazardous materials resulting from Project activities, including diesel fuel, gasoline, oil, and hydraulic fluids from construction or O&M equipment, into occupied waterbodies could result in adverse impacts on Curtis pearlymussels. Even if hazardous materials do not immediately enter aquatic habitats, subsequent rain events or flooding could transport these materials into receiving streams, rivers, or wetlands. Over-spraying of herbicides or off-label use of herbicides (i.e., those not approved for use near aquatic habitats) during noxious and invasive weed control during construction and operations and maintenance could also have direct negative effects on Curtis pearlymussels. The Project will develop and implement a SWPPP and general EPMs (e.g., refer to W-2, W-3, and W-4 in Section 5.4.6.1, "Environmental Protection Measures") to control sedimentation, erosion, and runoff from disturbed areas (see Section 2.5, "Environmental Protection Measures"), which would avoid and minimize impacts on Curtis pearlymussels.

O&M activities would include some personnel intermittently accessing the ROW with equipment such as mowers, ATVs, and four-wheel drive trucks; however, there will not be any in-stream work during this phase. Therefore, there will be no direct mortality or injuries to the Curtis pearlymussel during O&M. Impacts resulting from decommissioning activities are expected to be the same as those described above for construction, and the same species-specific measures would be implemented as during the construction phase.

Turbidity

Project-related activities could also result in direct impacts on the Curtis pearlymussel through sensory disturbances, including noise and ground vibration, which could stir up sediment. Project-related vehicles and equipment in waterbodies could also increase sediment and disrupt Curtis pearlymussel filter feeding and breeding mechanisms, by increasing turbidity and altering water levels. In general, these impacts would occur at the time of the disturbances and directly adjacent and downstream, and any effects on the Curtis pearlymussel should lessen and dissipate soon thereafter. However, Clean Line will minimize the potential for this impact through EPMs (e.g., refer to FVW-1, W-1, and W-2 in Section 5.4.6.1, "Environmental Protection Measures").

Habitat Loss/Alteration

Project-related activities could result in indirect impacts on Curtis pearlymussel through loss or alteration of sediments suitable for burrowing habitats, and could alter water levels and turbidity, which would impact an individual's ability to filter-feed from the water column above the sediment. Stream benthic disturbances and increased sediment deposition may result in a loss of native plants and substrates that may play ecologically important roles for the Curtis pearlymussel by moderating stream temperature and providing forage for host fish species. The Project will develop and implement a SWPPP and general EPMs (e.g., refer to GE-3, GEO-1, and W-1 in Section 5.4.6.1, "Environmental Protection Measures") to control sedimentation, erosion, and runoff from disturbed areas, which would avoid and minimize impacts on the Curtis pearlymussel.

Hazardous material spills and the over-spraying of herbicides, or the use of incorrect herbicides (i.e., those not approved for use near aquatic or riparian vegetation) during noxious and invasive weed control could result in short-term degradation of aquatic habitats. By damaging or removing native plant species, the water temperature and stream flow could be altered, which would impact both Curtis pearlymussels and host fish species. The Project will implement EPMs designed to avoid or reduce the potential for impacts on habitat from hazardous materials spills and increased sedimentation, including application of refueling and maintenance buffers (see GE-5 and GE-14 in Section 5.4.6.1, "Environmental Protection Measures").

Loss or alteration of aquatic and riparian vegetation could alter habitat in such a way that affects essential life processes for the Curtis pearlymussel, including reproduction, filter feeding, and burrowing. Loss or degradation of riparian trees and other vegetation on the banks of streams could negatively affect habitat quality by raising water temperatures and increasing erosion and sediment loads. Increases in water temperatures and levels of siltation in the water column or on substrates could render habitats unsuitable for essential life processes. For Curtis pearlymussels, impacts on herbaceous and shrubby vegetation would be short term, while removal of forested vegetation from riparian zones would be long term. Vegetation removal would be minimized by cutting vegetation at a height of no less than 6 feet within a buffer zone 100 feet from the OHWM, except where necessary for access (USFWS 2014).

All of the aforementioned impacts could also affect the Curtis pearlymussel's fish host, the rainbow darter. Mortality/injury or impacts on reproduction of Curtis pearlymussel populations would occur if the mussel's host fish were negatively impacted. This impact is considered temporary and short term, because fish are highly mobile and would most likely avoid areas of disturbance. However, Clean Line will minimize the potential for these impacts through EPMs outlined in Section 5.4.6.1, "Environmental Protection Measures."

Increased Competition

Project-related activities could result in indirect, negative impacts on Curtis pearlymussels through the introduction of non-native aquatic plant and wildlife species. Equipment working in a stream with non-native aquatic plant and wildlife species could introduce those species to a different stream if the equipment is not cleaned adequately between the two streams. Introduced non-native plants could alter habitats by outcompeting and replacing native plants essential to this species, which could, in turn, alter stream temperatures and reduce the Curtis pearlymussel's and host fish rainbow darter's ability to feed. Similarly, the introduction of non-native wildlife, such as the zebra mussel, could cause increased competition for food and appropriate sediment for habitat. Zebra mussels also impact native freshwater mussels by attaching to them (MDC 2002). In fact, zebra mussels may attach and kill native mussels (MDC 2002). However, Clean Line would minimize the potential for this impact through EPMs including FVW-2 (see Section 5.4.6.1, "Environmental Protection Measures"), which will identify measures to prevent the spread of, among other species, zebra mussels.

5.4.6 Protection Measures

Clean Line will use a number of measures to avoid or minimize impacts on the Curtis pearlymussel. This section describes these measures and includes EPMs and species-specific measures.

5.4.6.1 Environmental Protection Measures

The following EPMs—general (GE); soils (GEO); fish, vegetation, and wildlife (FVW); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on the Curtis pearlymussel.

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits.
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-4) – Vegetation removed during clearing will be disposed of according to federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-9) – Clean Line will avoid and/or minimize damage to drainage features and other improvements such as ditches, culverts, levees, tiles, and terraces; however, if these features or improvements are inadvertently damaged, they will be repaired and or restored.
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies, and groundwater wells, or as otherwise required by federal, state, or local regulations.

- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.
- (GE-23) – Clean Line will maximize the distance between stationary equipment and sensitive noise receptors consistent with engineering design criteria.
- (GE-27) – Clean Line will minimize compaction of soils and rutting through appropriate use of construction equipment (e.g., low ground pressure equipment and temporary equipment mats).
- (GE-28) – Hazardous materials and chemicals will be transported, stored, and disposed of according to federal, state, or local regulations or permit requirements.

Soils Measure:

- (GEO-1) – Clean Line will stabilize slopes exposed by its activities to minimize erosion.

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-2) – Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.

Waters, Wetlands, and Floodplains Measures:

- (W-1) – Clean Line will avoid and/or minimize construction of access roads in special interest waters.
- (W-2) – Clean Line will identify, avoid, and/or minimize adverse effects to wetlands and waterbodies. Clean Line will not place structure foundations within the Ordinary High Water Mark (OHWM) of Waters of the United States.
- (W-3) – Clean Line will establish streamside management zones within 50 feet of both sides of intermittent and perennial streams and along margins of bodies of open water where removal of low-lying vegetation is minimized.
- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.
- (W-5) – Clean Line will construct access roads to minimize disruption of natural drainage patterns including perennial, intermittent, and ephemeral streams.
- (W-6) – Clean Line will not construct counterpoise or fiber optic cable trenches across waterbodies.
- (W-7) – Clean Line will locate spoil piles from foundation excavations and fiber optic cable trenches outside of streamside management zones.

- (W-8) – Dewatering will be conducted in a manner designed to prevent soil erosion (e.g., through discharge of water to vegetated areas and/or the use of flow control devices).

5.4.6.2 Species-specific Measures

The Curtis pearlymussel is believed extirpated from all previously known locations, including waterbodies crossed by the Project (USFWS 2010). However, if the Curtis pearlymussel were to be in an area crossed by the Project, the EPMs listed in Section 5.4.5.1, “Environmental Protection Measures,” would serve to lessen any impacts on this species.

5.4.7 Effects Determination

The counties with the last known presence of Curtis pearlymussel near the Project Action Area are north of the Project, therefore, there is no potential for contamination of those upstream portions of the watershed. Further, the Curtis pearlymussel is believed extirpated from all previously known locations and is possibly extinct (USFWS 2010). In addition, the Project will span waterbodies, and it will implement an approved SWPPP and protection measures (see Section 5.4.6, “Protection Measures”) to reduce erosion and chemical spill impacts. Clean Line will avoid in-stream work; however, if in-stream work is necessary in the Curtis pearlymussel’s range, Clean Line will coordinate with the USFWS and the appropriate state resource management agencies to determine the need for pre-construction surveys and to identify site-specific measures to avoid or minimize impacts at occupied crossings (see FVW-5).

Taking into consideration the proposed Project design as well as the implementation of the aforementioned EPMs and species-specific measures proposed by Clean Line, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project “may affect, but is not likely to adversely affect” the Curtis pearlymussel.

The Curtis pearlymussel does not currently have designated critical habitat; therefore, the Project “will not destroy or adversely modify” critical habitat for the species.

5.5 Fanshell

In their April 2, 2014, correspondence, the USFWS identified the fanshell mussel (*Cyprogenia stegaria*) as one of the federally listed species that occurs within the Arkansas portion of the Project, specifically in Jackson County. However, there is no evidence that the fanshell has been observed in Arkansas. The fanshell mussel's historic range included the Ohio, Wabash, Cumberland, and Tennessee Rivers, along with their larger tributaries in Alabama, Illinois, Indiana, Kentucky, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia (USFWS 1990, 2009). The current known healthy populations of fanshell occur in the Licking, Green, and Rolling Fork Rivers in Kentucky, and in the Clinch River in Tennessee and Virginia (USFWS 2009). As such, impacts on the fanshell mussel are not expected and, therefore, are not discussed in detail in this document.

5.6 Fat Pocketbook

The USFWS listed the fat pocketbook (*Potamilus capax*) as endangered on June 14, 1976 (USFWS 1976). Critical habitat has not been designated for the fat pocketbook.

5.6.1 Natural History

Range

The fat pocketbook's range historically included the larger streams in the Mississippi and Ohio River systems, with species accounts in the upper Mississippi River above St. Louis, Missouri, the Wabash River in Indiana and the St. Francis River in Arkansas (Harris et al. 1987). The fat pocketbook is known to or believed to occur in portions of Arkansas, Illinois, Indiana, Kentucky, Louisiana, Mississippi, and Missouri (USFWS 2013a). Current accounts of fat pocketbook are largely confined to about 20 sites in the lower Wabash and Ohio Rivers, the St. Francis River, and the southeastern most part of Missouri (NatureServe 2013). However, the recent discovery of a lower Mississippi River population in Jefferson County, Mississippi, suggests that the species may be expanding its range on localized levels (USFWS 2012). In Arkansas, the species' current range is mainly limited to the St. Francis River and its associated human-made perennial irrigation canals and tributaries, with few occurrences reported from the White River (USFWS 1989, 2012). Figure 5.6-1, "Potential Presence of Fat Pocketbook in the Action Area," shows the fat pocketbook's current and historic range by watershed boundary.

Habitat

The fat pocketbook is a riverine species found in a variety of fine-grained substrates including sand, silt, and clay (USFWS 1989). It occurs in slow-moving bayous, sloughs, streams, and human-made ditches. The thin-shelled morphology of this species allows it to tolerate deep deposits of fine-grained silt; however, it is not well suited for gravel substrates within highly erosive flow environments (Miller and Payne 2005). Historically, the fat pocketbook was common in large river sloughs, oxbows, and river mouths and deltas. However, the advent and construction of locks, dams, levees, and bank protection measures have altered natural sediment deposition, and currently the fat pocketbook most often occurs in human-made irrigation canals and tributaries that flow into the St. Francis River, where depositional habitats occur (Anderson 2006).

Breeding

The fat pocketbook is a bradytictic spawner. Like all freshwater mussel species, the fat pocketbook begins life in a larval phase known as a glochidium (plural: glochidia). This phase lasts throughout the winter until the following spring or summer (Baldridge, Christian, and Peck 2007). During the glochidia phase, the fat pocketbook attaches to the gills of the host fish, freshwater drum (*Aplodinotus grunniens*), before developing into a shelled juvenile mussel (Cummings and Mayer 1993). The fat pocketbook, like the life cycle of other freshwater mussel species, complete transformation from glochidia to shelled, burrowing juveniles in approximately two to four weeks (MDC 2013). Once the fat pocket book develops into an adult, this species is ready to breed through indirect fertilization; meaning the males discharge sperm into the water column, which moves with the current (USFWS 1997). Females draw in sperm by way of siphoning water. Fertilization takes place in the spring, with gravid (egg-carrying) females present from June to October (Baldridge, Christian, and Peck 2007).

Feeding

Like most freshwater mussels, the fat pocketbook is a filter feeder. Freshwater mussels have gills modified to trap food particles (algal detritus and/or microorganisms) that are in the water column and move with the current (Ruppert and Barnes 1994). The gills have multiple filaments and cilia that aid in trapping and transporting food materials back to the digestive organs. Siphons are exposed above the burrow location, and play a role in the feeding process as well.

Locomotion

The fat pocketbook, like most freshwater mussels, has a compressed, blade-like muscle, known as a "foot," that is used for movement (Ruppert and Barnes 1994). All freshwater mussels use their foot, along with a variety of other muscles within their shell cavity, to burrow down into a preferred substrate. The fat pocketbook prefers sand, mud, and fine gravel bottoms to burrow down into, exposing just the shell edge and water siphons to the water column (USFWS 1997). In most instances, the only movements made by freshwater mussels are vertical motions to adjust the position within the substrate burrow (Smith 2013). These vertical movements are typically in response to environmental stimuli correlated to feeding or breeding to make sure the mussel's position in the substrate allows it to access the water column (USFWS 1997). Small migrations of freshwater mussels, and likely fat pocketbooks, are possible, but on a small scale (i.e., short distances and short timeframes) and would be a result of habitats becoming unsuitable through changes in water level, sedimentation regiments, reduction of food availability, or introduction of contaminants (USDA NRCS 2007).

5.6.2 Population Status

At the time of listing, the fat pocketbook population estimate was 11,000 to 24,000, with most individuals located within a 43-mile stretch of the St. Francis Floodway of Arkansas (USFWS 2012). Individuals have since been collected in several other locations/states, including the White River in Arkansas and the lower Mississippi River, and data suggest abundance is increasing (USFWS 2012). The online NatureServe database lists the population at 10,000 to 100,000 (NatureServe 2013). However, a range-wide survey for the fat pocketbook has not been conducted; therefore, a conclusive range-wide population estimate is not available.

5.6.3 Current Threats

Destruction and alteration of habitat is the most serious threat to the fat pocketbook. Primary habitat threats include waterbody impoundments (e.g., dams) and channelization related to flood control and navigation (e.g., dredging). Construction of dams, dredging, and channelization can cause physical removal of individuals from habitat, inundate and destabilize habitats, and change flow regimes (USFWS 2012). Habitat and population fragmentation resulting from human disturbance (e.g., locks, dams, levees, etc.) makes localized populations vulnerable to droughts, water pollution, and chemical spills (USFWS 2009). Other threats include general water quality degradation from non-point and point pollution sources, invasive species competition (e.g., zebra mussels), climate change, and host fish population declines (from channel dredging, pollution, etc.). While the fat pocketbook prefers higher turbidity environments (river systems), significant increases in sedimentation and turbidity (suspended sediments) through human-made activities (including watercraft activities) could detrimentally affect the species by clogging their gills and/or siphons. This would reduce an individual's ability to feed, breed, and its respiratory functions, which would disrupt metabolic processes, decrease growth, limit burrowing activity, and physically smother the animal (USDA NRCS 2007; USFWS 2012). This increase of suspended sediment also has the potential to erode mussels' shells, making them more susceptible to pollution (USDA NRCS 2007).

5.6.4 Potential Presence in the Action Area

Definition of the Action Area

Clean Line has defined the fat pocketbook Action Area as the intersection of the project disturbance footprint with the main stem of the St. Francis and White Rivers and their associated fine-grained bottom, slow-moving streams, sloughs, and human-made ditches (i.e., human-altered streams and tributaries, canals, etc. that support freshwater drum) (see Figure 5.6-1, "Potential Presence of Fat Pocketbook in the Action Area"). To account for any potential contamination, the Action Area will extend 100 feet upstream and 300 feet downstream of stream crossings in suitable habitat (USFWS 2014).

Presence in the Action Area Based on Existing Data

The counties crossed by the Project with reported fat pocketbook presence are White, Poinsett, Cross, and Mississippi Counties. Figure 5.6-1, "Potential Presence of Fat Pocketbook in the Action Area," documents the potential presence of the fat pocketbook in proximity to the Project.

5.6.5 Direct and Indirect Impacts

Direct Mortality/Injury

Clean Line will avoid in-stream work and bank disturbance at occupied crossings. However, if in-stream work is deemed necessary, potential activities during construction may include excavation or travel through water, which could result in individual mussels (if present) being crushed or buried by equipment or personnel. If in-stream work (within the Action Area) is required during construction, Clean Line would coordinate with the USFWS and the appropriate state resource management agencies to determine the need for pre-construction surveys and to identify site-specific measures to avoid or minimize impacts at occupied crossings (see FVW-5 and Section 5.6.6.2, "Species-specific Measures").

Spills of hazardous materials resulting from Project activities, including diesel fuel, gasoline, oil, and hydraulic fluids from construction or O&M equipment, into occupied waterbodies could result in adverse impacts on fat pocketbook mussels. Even if hazardous materials do not immediately enter aquatic habitats, subsequent rain events or flooding could transport these materials into receiving streams, rivers, or wetlands. Over-spraying of herbicides or off-label use of herbicides (i.e., those not approved for use near aquatic habitats) during noxious and invasive weed control during construction and operations and maintenance could also have direct negative effects on fat pocketbook mussels. The Project will develop and implement a SWPPP and general EPMs (e.g., refer to W-2, W-3, and W-4 in Section 5.6.6.1, "Environmental Protection Measures") to control sedimentation, erosion, and runoff from disturbed areas, which will avoid and minimize impacts on the fat pocketbook.

Operations and maintenance activities would include some personnel intermittently accessing the ROW with equipment such as mowers, ATVs, and four-wheel drive trucks; however, there will not be any in-stream work during this phase. Therefore, there will be no direct mortality or injuries to the fat pocketbook during operations and maintenance. Impacts resulting from decommissioning activities are expected to be the same as those described above for construction, and the same EPMs will be implemented as during the construction phase.

Turbidity

Project-related activities could also result in direct impacts on the fat pocketbook through sensory disturbances, including noise and ground vibration, which could stir up sediment. Project-related vehicles and equipment in waterbodies could also increase sediment and disrupt fat pocketbook filter feeding and breeding mechanisms, by increasing turbidity and altering water levels. In general, these impacts would occur at the time of the disturbances, and any effects on the fat pocketbook should lessen and dissipate soon thereafter. However, Clean Line will minimize the potential for this impact through EPMs (e.g., refer to FVW-1, W-1, and W-2 in Section 5.6.6.1, "Environmental Protection Measures").

Habitat Loss/Alteration

Project-related activities could result in indirect impacts on fat pocketbook through loss or alteration of sediments suitable for burrowing habitats, and could alter water levels and turbidity, which would impact an individual's ability to filter-feed from the water column above the sediment. Stream benthic disturbances and increased sediment deposition may result in a loss of native plants and substrates that may play ecologically important roles for the fat pocketbook by moderating stream temperature and providing forage for host fish species. The Project will develop and implement a SWPPP and general EPMs (e.g., refer to GE-3, GEO-1, and W-1 in Section 5.6.6.1, "Environmental Protection Measures") to control sedimentation, erosion, and runoff from disturbed areas, which will avoid and minimize impacts on the fat pocketbook.

Hazardous material spills and the over-spraying of herbicides, or the use of incorrect herbicides (i.e., those not approved for use near aquatic or riparian vegetation) during noxious and invasive weed control could result in short-term degradation of aquatic habitats by damaging or removing native plant species, that could alter the water temperature and stream flow and impact both fat pocketbook mussels and host fish species. The Project will implement EPMs and species-specific measures designed to avoid or reduce the potential for impacts on habitat from hazardous materials spills and increased sedimentation, including application of refueling and maintenance buffers (see GE-5 and GE-14 in Section 5.6.6.1, "Environmental Protection Measures").

Loss or alteration of aquatic and riparian vegetation could alter habitat in such a way that affects essential life processes for the fat pocketbook, including reproduction, filter feeding, and burrowing. Loss or degradation of riparian trees and other vegetation on the banks of streams could negatively affect habitat quality by raising water temperatures and increasing erosion and sediment loads. Increases in water temperatures and levels of siltation in the water column or on substrates could render habitats unsuitable for essential life processes. For fat pocketbook mussels, impacts on herbaceous and shrubby vegetation would be short term, while removal of forested vegetation from riparian zones would be long term. Vegetation removal would be minimized by cutting vegetation at a height of no less than 6 feet within a buffer zone 100 feet from the OHWM, except where necessary for access (see Section 5.6.6.2, "Species-specific Measures").

All of the aforementioned impacts could also affect the fat pocketbook's fish host, the freshwater drum. Mortality/injury or impacts on reproduction of fat pocketbook populations would occur if the mussel's host fish were negatively impacted. This impact is considered temporary and short-term, because fish are highly mobile and would most likely avoid areas of disturbance. However, Clean Line will minimize the potential for these impacts through EPMs and species-specific measures outlined in Section 5.6.6, "Protection Measures."

Increased Competition

Project-related activities could result in indirect, negative impacts on fat pocketbook mussels through the introduction of non-native aquatic plant and wildlife species. Equipment working in a stream with non-native aquatic plant and wildlife species could introduce those species to a different stream if the equipment is not cleaned adequately between the two streams. Introduced non-native plants could alter habitats by outcompeting and replacing native plants essential to this species or its host fish species, which could, in turn, alter stream temperatures and reduce the fat pocketbook's ability to feed. Similarly, the introduction of non-native wildlife, such as the zebra mussel, could cause increased competition for food and appropriate sediment for habitat. Zebra mussels may also directly impact native freshwater mussels by attaching to them (MDC 2002). In fact, zebra mussels may attach and kill native mussels (MDC 2002). However, Clean Line will minimize the potential for this impact through implementation of EPMs including FVW-2 (see Section 5.6.6.1, "Environmental Protection Measures"), which will identify measures to prevent the spread of non-native species.

5.6.6 Protection Measures

Clean Line will use a number of measures to avoid or minimize impacts on the fat pocketbook. These measures are described in below and include EPMs and species-specific measures.

5.6.6.1 Environmental Protection Measures

The following EPMs—general (GE); fish, vegetation, and wildlife (FVW); soils (GEO); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on fat pocketbook.

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits.
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-4) – Vegetation removed during clearing will be disposed of according to federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-9) – Clean Line will avoid and/or minimize damage to drainage features and other improvements such as ditches, culverts, levees, tiles, and terraces; however, if these features or improvements are inadvertently damaged, they will be repaired and or restored.
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies, and groundwater wells, or as otherwise required by federal, state, or local regulations.
- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.
- (GE-23) – Clean Line will maximize the distance between stationary equipment and sensitive noise receptors consistent with engineering design criteria.

- (GE-27) – Clean Line will minimize compaction of soils and rutting through appropriate use of construction equipment (e.g., low ground pressure equipment and temporary equipment mats).
- (GE-28) – Hazardous materials and chemicals will be transported, stored, and disposed of according to federal, state, or local regulations or permit requirements.

Soils Measure:

- (GEO-1) – Clean Line will stabilize slopes exposed by its activities to minimize erosion.

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-2) – Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.

Waters, Wetlands, and Floodplains Measures:

- (W-1) – Clean Line will avoid and/or minimize construction of access roads in special interest waters.
- (W-2) – Clean Line will identify, avoid, and/or minimize adverse effects to wetlands and waterbodies. Clean Line will not place structure foundations within the OHWM of Waters of the United States.
- (W-3) – Clean Line will establish streamside management zones within 50 feet of both sides of intermittent and perennial streams and along margins of bodies of open water where removal of low-lying vegetation is minimized.
- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.
- (W-5) – Clean Line will construct access roads to minimize disruption of natural drainage patterns including perennial, intermittent, and ephemeral streams.
- (W-6) – Clean Line will not construct counterpoise or fiber optic cable trenches across waterbodies.
- (W-7) – Clean Line will locate spoil piles from foundation excavations and fiber optic cable trenches outside of streamside management zones.
- (W-8) – Dewatering will be conducted in a manner designed to prevent soil erosion (e.g., through discharge of water to vegetated areas and/or the use of flow control devices).

5.6.6.2 Species-specific Measures

In addition to the EPMs described above, species-specific measures based on recommendations from USFWS (2014) would include the following:

- Pre-construction mussels surveys to determine the presence/absence of the fat pocketbook will be performed in waterbody crossings where bank disturbance or in-stream construction activities will occur in the White River, and perennial streams/rivers/ditches capable of supporting freshwater drum in the St. Francis River basin (USFWS 2014);
- Where presence is documented or as determined through consultation with the USFWS, vegetation removal would be minimized by cutting vegetation to a height of no less than 6 feet within a buffer zone 100 feet from the OHWM (i.e., the river buffer zone), except where necessary for access (USFWS 2014);
- Per FVW-5, if waterbodies with known or presumed presence of fat pocketbook mussels require in-stream work, then Clean Line would coordinate with USFWS and applicable state resource agencies to identify site-specific minimization measures to avoid impacts.

5.6.7 Effects Determination

The Project will span waterbodies, and it will implement an approved SWPPP and protection measures (see Section 5.6.6, "Protection Measures") to reduce erosion and chemical spill impacts. Clean Line will avoid in-stream work; however, if in-stream work is necessary in the fat pocketbook's range, Clean Line will commit to pre-construction surveys, and coordinate with the USFWS and the appropriate state resource management agencies to determine the nature of those surveys and to identify site-specific measures to avoid or minimize impacts at occupied crossings (see FVW-5 and Section 5.6.6, "Species-specific Measures"). Additionally, Clean Line will coordinate with the USFWS to ensure the appropriate avoidance or minimization measures are implemented effectively.

Taking into consideration the proposed Project design as well as the implementation of the aforementioned EPMs and species-specific measures proposed by Clean Line, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project "may affect, but is not likely to adversely affect" the fat pocketbook.

The fat pocketbook does not currently have designated critical habitat; therefore, the Project "will not destroy or adversely modify" critical habitat for the species.

5.7 Neosho Mucket

In their May 2, 2013, correspondence relating to the Project, the USFWS identified the Neosho mucket (*Lampsilis rafinesqueana*) as one of the federally proposed species that occurs within the Oklahoma portion of the Project—specifically, in Adair County. The Neosho mucket is now extirpated from 70% of its historic range, which included the Illinois, Neosho, and Verdigris river basins in Arkansas, Kansas, Missouri, and Oklahoma (MDC 2013). The Project is located south of Adair County, Oklahoma. As such, no effects on the Neosho mucket are expected from the Project.

5.8 Pink Mucket

The USFWS proposed the pink mucket (*Lampsilis abrupta*) as endangered in September 1975 (USFWS 1985). No critical habitat has been designated for the pink mucket.

5.8.1 Natural History

Range

Historically, the pink mucket occurred in 25 river systems and was extremely widespread throughout the Interior Basin, although it was considered rare or uncommon (USFWS 1985; MDC 2013). This species was reported from river systems in Ohio, Indiana, Illinois, Missouri, Iowa, West Virginia, Virginia, Alabama, Tennessee, Arkansas, Kentucky, and Louisiana. Currently, this species is known to occur in the Black, Ouachita, White, and Spring Rivers (Arkansas); the Cumberland River (Kentucky and Tennessee); the St. Francis, Sac, and Meramec Rivers (Missouri); the Osage River (Missouri); the Kanawha and Elk Rivers (West Virginia); the Ohio River (Kentucky and West Virginia); and the Tennessee River (Alabama and Kentucky) (Cummings and Cordeiro 2012; USFWS 1985).

It is now considered extirpated from Pennsylvania and New York, and likely from Ohio (NatureServe 2013). This range reduction has relegated the pink mucket to 16 river systems, an estimated 30% decrease in range during a 25- to 50-year timeframe (Cummings and Cordeiro 2012).

Habitat

The pink mucket is typically found in medium to large rivers with moderate to fast-flowing water (USFWS 1985). This species can be found in both deep water (up to 5 feet) and shallow riffles (down to 1 inch) (MDC 2013; USFWS 2013c). Preferred substrates include relatively silt-free substrates of sand, gravel, cobble, and rocky pockets in fast moving water, or sand and mud in slower to moderate currents (Gordon and Layzer 1989; MDC 2013; USFWS 2013b).

Breeding

The pink mucket is a bradytictic spawner that breeds in August and September and the females release their glochidia offspring the following year from May to July (MDC 2013). During the glochidia phase, the pink mucket attaches to the gills of the host fish before developing into a shelled juvenile mussel (Cummings and Mayer 1993). Lab tests with 19 potential fish hosts have found that the pink mucket can use four fish host species to complete its life cycle, including largemouth (*Micropterus salmoides*), smallmouth (*Micropterus dolomieu*), and spotted bass (*Micropterus punctulatus*), along with walleye (*Stizostedion vitreum*) (MDC 2013; USFWS 2014a). The pink mucket, like other freshwater mussel species, complete their transformation from glochidia to shelled, burrowing juveniles in approximately two to four weeks. Pink muckets breed through indirect fertilization; meaning the males discharge sperm into the water column, which moves with the current (USFWS 1985). Females draw in sperm by way of siphoning water. Fertilization takes place in summer, with gravid (egg-carrying) females present in August and having glochidia in September, which are released the following year in June (USFWS 1985).

The pink mucket female possesses a spotted mantle flap that may act as bait mimicking a fish eyespot and attracting a larger fish host (USFWS 2014a). This spotted mantle flap has been observed on other *Lampsilis* species, but is unique to this genus among freshwater mussels (USFWS 1985). This unique morphology allows the female to attract a host fish species and then expel its glochidia into the host fish, allowing them to attach to the fish's gills and complete their glochidial phase (USFWS 2014a).

Feeding

Like most freshwater mussels, the pink mucket is a filter feeder. Freshwater mussels have gills modified to trap food particles (algal detritus and/or microorganisms) that are in the water column and move with the current (Ruppert and Barnes 1994). As an adult, the pink mucket ingests bacteria, algae, detritus, and sediment (USFWS 2014a). Mussels also gather unwanted toxins from the water as a byproduct of their filter feeding for nutrients (MDC 2013). Their gills have multiple filaments and cilia that aid in trapping and transporting food materials back to the digestive organs. Siphons are exposed above the burrow location, and play a role in the feeding process as well.

Like other freshwater mussels, the diet of pink mucket glochidia consists of water before they are encysted on a fish host. Once encysted, the glochidia parasitically feed on the fish body fluids (USFWS 2014a).

Locomotion

Freshwater mussels, like most bivalves, have a compressed, blade-like muscle, known as a “foot,” that is used for movement (Ruppert and Barnes 1994). Mussels use their foot, along with a variety of other muscles within their shell cavity, to burrow down into a preferred substrate. The pink mucket will use a variety of substrates, but prefers gravel-cobble bottoms to burrow down into, exposing just the shell edge and water siphons to the water column (MDC 2013). In most instances, the only movements made by freshwater mussels are vertical motions to adjust the position within the substrate burrow (Smith 2013). Movements are typically in response to environmental stimuli correlated to feeding or breeding. Migrations are possible, but on a small scale (i.e., short distances and short timeframes) and would be a result of habitats becoming unsuitable through changes in water level, sedimentation regiments, reduction of food availability, or introduction of contaminants (USDA NRCS 2007). More mobile species of freshwater mussels have been observed moving 5 feet in a few hours, but most movement was related to seasonal changes and breeding activities (Fobian 2007).

5.8.2 Population Status

The pink mucket has experienced a significant range reduction (USFWS 2014a). A conclusive population estimate is not available for the pink mucket as range-wide survey data for this species is limited. However, the online NatureServe database lists the population at 2,500 to 100,000 (NatureServe 2013).

5.8.3 Current Threats

The most serious threat to the pink mucket is destruction and alteration of its habitat (USFWS 1985). Primary threats to habitat include waterbody impoundments (e.g., dams), sedimentation from runoff and in-stream waste disposal associated with gravel mining, and channelization related to flood control and navigation (dredging, etc.). Impoundments can cause aquatic habitat to flood, reducing gravel substrate and potentially limiting the distribution of fish hosts needed for larval mussel development, including pink mucket larvae (MDC 2002; USFWS 2013c). Changes in water temperature from impoundments can also be a limiting factor to reproduction in freshwater mussel species, including the pink mucket (Heinricher and Layzer 1999). Other threats include non-point source pollution runoff, as well as silt erosion caused by mining, farming, and road construction practices (USFWS 1985). Increased silt loads into riverine habitats can impair the ability of freshwater mussels, like the pink mucket, to filter feed and can even bury individuals (USFWS 2013c). Construction activities that could result in impacts on pink mucket habitat include water withdraws from pick mucket inhabited rivers, alterations to hydrology, sedimentation, chemical releases in pink mucket habitat, low-water crossings, and any in-channel work (USFWS 2013d).

5.8.4 Potential Presence in the Action Area

Definition of the Action Area

Clean Line has defined the pink mucket Action Area as the intersection of the project disturbance footprint with the main stem of the White River and its associated perennial tributaries (see Figure 5.8-1, "Potential Presence of Pink Mucket in the Action Area"). To account for any potential contamination, the Action Area would extend 100 feet upstream and 300 feet downstream of stream crossings in suitable habitat (USFWS 2014b).

Presence in the Action Area Based on Existing Data

The USFWS identified that the species potential range crossed by the Project includes Jackson and White Counties, Arkansas (USFWS 2013a). Additionally, this species occurs in the White River and its tributaries located within the adjacent Project counties including Independence, Lawrence, and Woodruff (USFWS 2013b). The pink mucket occurs farther east in Tennessee, with the closest county records to the Project existing in Benton, Decatur, and Hardin Counties (USFWS 2013b). This species does not commonly occur in Oklahoma or Texas. Figure 5.8-1, "Potential Presence of Pink Mucket in the Action Area," depicts the potential presence of the pink mucket in proximity to the Project, as well as previously confirmed locations of the species.

5.8.5 Direct and Indirect Impacts

Direct Mortality/Injury

Clean Line will avoid in-stream work and bank disturbance at occupied crossings. However, if in-stream work is deemed necessary, potential activities during construction may include excavation or travel through water, which could result in individual mussels being crushed or buried (if present) by equipment or personnel. If in-stream work (within the Action Area) is required during construction, Clean Line would coordinate with the USFWS and the appropriate state resource management agencies to determine the need for pre-construction surveys and to identify site-specific measures to avoid or minimize impacts at occupied crossings (see FVW-5 and in Section 5.8.6.2, "Species-specific Measures").

Spills of hazardous materials resulting from Project activities, including diesel fuel, gasoline, oil, and hydraulic fluids from construction or O&M equipment, into occupied waterbodies could result in adverse impacts on pink mucket mussels. Even if hazardous materials do not immediately enter aquatic habitats, subsequent rain events or flooding could transport these materials into receiving streams, rivers, or wetlands. Over-spraying of herbicides or off-label use of herbicides (i.e., those not approved for use near aquatic habitats) during noxious and invasive weed control during construction and operations and maintenance could also have direct negative effects on pink mucket mussels. The Project will develop and implement a SWPPP and general EPMs (e.g., refer to W-2, W-3, and W-4 in Section 5.8.6.1, "Environmental Protection Measures") to control sedimentation, erosion, and runoff from disturbed areas (see Section 2.5, "Environmental Protection Measures"), which will avoid and minimize impacts on the pink mucket.

Operations and maintenance activities would include some personnel intermittently accessing the ROW with equipment such as mowers, ATVs, and four-wheel drive trucks; however, there will not be any in-stream work during this phase. Therefore, there will be no direct mortality or injuries to the pink mucket during operations and maintenance. Impacts resulting from decommissioning activities are expected to be the same as those described above for construction, and the same EPMs will be implemented as during the construction phase.

Turbidity

Project-related activities could also result in direct impacts on the pink mucket through sensory disturbances, including noise and ground vibration, which could stir up sediment. Project-related vehicles and equipment in waterbodies could also increase sediment and disrupt pink mucket filter feeding and breeding mechanisms by increasing turbidity and altering water levels. In general, these impacts would occur at the time of the disturbances, and any effects on the pink mucket should lessen and dissipate soon thereafter. However, Clean Line will minimize the potential for this impact through EPMs (e.g., refer to FVW-1, W-1, and W-2 in Section 5.8.6.1, "Environmental Protection Measures").

Habitat Loss/Alteration

Project-related activities could result in indirect impacts on freshwater mussels through loss or alteration of sediments suitable for burrowing habitats, and could alter water levels and turbidity, which would impact an individual's ability to filter-feed from the water column above the sediment. Stream benthic disturbances and increased sediment deposition may result in a loss of native plants and substrates that may play ecologically important roles for the pink mucket by moderating stream temperature and providing forage for host fish species. The Project will develop and implement a SWPPP and EPMs (e.g., refer to GE-3, GEO-1, and W-1 in Section 5.8.6.1, "Environmental Protection Measures") to control sedimentation, erosion, and runoff from disturbed areas (see Section 2.5, "Environmental Protection Measures"), which will avoid and minimize impacts on the pink mucket.

Hazardous material spills and the over-spraying of herbicides, or the use of incorrect herbicides (i.e., those not approved for use near aquatic or riparian vegetation) during noxious and invasive weed control could result in short-term degradation of aquatic habitats by damaging or removing native plant species, that could alter the water temperature and stream flow and impact both pink mucket mussels and host fish species. The Project will implement EPMs and species-specific measures designed to avoid or reduce the potential for impacts on habitat from hazardous materials spills and increased sedimentation, including application of refueling and maintenance buffers (see GE-5 and GE-14 in Section 5.8.6.1, "Environmental Protection Measures").

Loss or alteration of aquatic and riparian vegetation could alter habitat in such a way that affects essential life processes for the pink mucket, including reproduction, filter feeding, and burrowing. Loss or degradation of riparian trees and other vegetation on the banks of streams could negatively affect habitat quality by raising water temperatures and increasing erosion and sediment loads. Increases in water temperatures and levels of siltation in the water column or on substrates could render habitats unsuitable for essential life processes. For pink mucket mussels, impacts on herbaceous and shrubby vegetation would be short term, while removal of forested vegetation from riparian zones would be long term. Vegetation removal would be minimized by cutting vegetation at a height of no less than 6 feet within a buffer zone 100 feet from the OHWM, except where necessary for access (see Section 5.8.6.2 "Species-specific Measures").

All of the aforementioned impacts could also affect the pink mucket's fish hosts: the largemouth, smallmouth, and spotted bass, along with walleye. Mortality/injury or impacts on reproduction of pink mucket populations would occur if the mussel's host fish were negatively impacted. These impacts are considered temporary and short-term because fish are highly mobile and would most likely avoid areas of disturbance. However, Clean Line will minimize the potential for these impacts through EPMs and species-specific measures outlined in Section 5.8.6, "Protection Measures."

Increased Competition

Project-related activities could result in indirect, negative impacts on pink mucket mussels through the introduction of non-native aquatic plant and wildlife species. Equipment working in a stream with non-native aquatic plant and wildlife species could introduce those species to a different stream if the equipment is not cleaned adequately between the two streams.

Introduced non-native plants could alter habitats by outcompeting and replacing native plants essential to this species or its host fish species, which could, in turn, alter stream temperatures and reduce the pink mucket's ability to feed. Similarly, the introduction of non-native wildlife, such as the zebra mussel, could cause increased competition for food and appropriate sediment for habitat. Zebra mussels may also directly impact native freshwater mussels by attaching to them (MDC 2002). In fact, zebra mussels may attach and kill native mussels (MDC 2002). However, Clean Line will minimize the potential for this impact through implementation of EPMs including FVW-2 (see Section 5.8.6.1, "Environmental Protection Measures"), which will identify measures to prevent the spread of non-native species.

5.8.6 Protection Measures

Clean Line will use a number of measures to avoid or minimize impacts on the pink mucket. The measures described below include EPMs and species-specific measures.

5.8.6.1 Environmental Protection Measures

The following EPMs—general (GE); fish, vegetation, and wildlife (FVW); soils (GEO); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on pink mucket.

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits.
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-4) – Vegetation removed during clearing will be disposed of according to federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-9) – Clean Line will avoid and/or minimize damage to drainage features and other improvements such as ditches, culverts, levees, tiles, and terraces; however, if these features or improvements are inadvertently damaged, they will be repaired and or restored.
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface

waterbodies, and groundwater wells, or as otherwise required by federal, state, or local regulations.

- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.
- (GE-23) – Clean Line will maximize the distance between stationary equipment and sensitive noise receptors consistent with engineering design criteria.
- (GE-27) – Clean Line will minimize compaction of soils and rutting through appropriate use of construction equipment (e.g., low ground pressure equipment and temporary equipment mats).
- (GE-28) – Hazardous materials and chemicals will be transported, stored, and disposed of according to federal, state, or local regulations or permit requirements.

Soils Measure:

- (GEO-1) – Clean Line will stabilize slopes exposed by its activities to minimize erosion.

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-2) – Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.

Waters, Wetlands, and Floodplains Measures:

- (W-1) – Clean Line will avoid and/or minimize construction of access roads in special interest waters.
- (W-2) – Clean Line will identify, avoid, and/or minimize adverse effects to wetlands and waterbodies. Clean Line will not place structure foundations within the OHWM of Waters of the United States.
- (W-3) – Clean Line will establish streamside management zones within 50 feet of both sides of intermittent and perennial streams and along margins of bodies of open water where removal of low-lying vegetation is minimized.
- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.
- (W-5) – Clean Line will construct access roads to minimize disruption of natural drainage patterns including perennial, intermittent, and ephemeral streams.
- (W-6) – Clean Line will not construct counterpoise or fiber optic cable trenches across waterbodies.

- (W-7) – Clean Line will locate spoil piles from foundation excavations and fiber optic cable trenches outside of streamside management zones.
- (W-8) – Dewatering will be conducted in a manner designed to prevent soil erosion (e.g., through discharge of water to vegetated areas and/or the use of flow control devices).

5.8.6.2 Species-specific Measures

In addition to the EPMs described above, species-specific measures based on recommendations from USFWS (2014a, 2014b) would include the following:

- Pre-construction mussel surveys to determine the presence/absence of pink mucket will be performed in waterbody crossings with potential populations of pink mucket, where bank disturbance or in-stream construction activities will occur in Jackson and White Counties, Arkansas (USFWS 2014b);
- Where presence is documented or as determined through consultation with the USFWS, vegetation removal would be minimized by cutting vegetation to a height of no less than 6 feet within a buffer zone 100 feet from the OHWM (i.e., the river buffer zone), except where necessary for access (USFWS 2014a);
- If waterbodies with known or presumed presence of pink mucket mussels require in-stream work, then Clean Line will coordinate with the USFWS and applicable state resource agencies to identify site specific minimization measures to avoid impacts.

5.8.7 Effects Determination

The Project will span waterbodies and it will implement an approved SWPPP and protection measures (see Section 5.8.6, "Protection Measures") to reduce erosion and chemical spill impacts. Clean Line will avoid in-stream work; however, if in-stream work is necessary in the pink mucket's range, Clean Line will commit to pre-construction surveys, and coordinate with the USFWS and the appropriate state resource management agencies to determine the nature of those surveys and identify site-specific measures to avoid or minimize impacts at occupied crossings (see FVW-5 and Section 5.8.6.2, "Species-specific Measures"). Additionally, Clean Line will coordinate with the USFWS to ensure the appropriate avoidance or minimization measures are implemented effectively.

Taking into consideration the proposed Project design as well as the implementation of the aforementioned EPMs and species-specific measures proposed by Clean Line, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project "may affect, but is not likely to adversely affect" the pink mucket.

The pink mucket does not currently have designated critical habitat; therefore, the Project "will not destroy or adversely modify" critical habitat for the species.

5.9 Rabbitsfoot

The USFWS listed the rabbitsfoot (*Quadrula cylindrica cylindrica*) threatened on September 17, 2013 (USFWS 2013a). Critical habitat has not been designated for the rabbitsfoot; however, the USFWS proposed critical habitat designation on October 2012 (see Figure 5.9-1, "Potential Presence of Rabbitsfoot in the Action Area") (USFWS 2012). Proposed critical habitat for the rabbitsfoot includes the following counties within the Project area: (Arkansas) Jackson, Van Buren, and White Counties (USFWS 2013b). Additionally, proposed critical habitat is located within the adjacent Project counties: (Arkansas) Independence, Lawrence, Newton, Searcy, and Woodruff (USFWS 2013b). Proposed critical habitat for this species is also present in (Oklahoma) McCurtain and Rogers Counties, and (Tennessee) Hardin, Hickman, Marshall, Maury, and Robertson Counties. However, these areas are not located within or adjacent to the Project (USFWS 2013a). More specifically, proposed critical habitat in Arkansas includes the following waterbodies: Ouachita River (Clark, Hot Springs, Montgomery, and Ouachita Counties); Saline River (Ashley, Bradley, Cleveland, Dallas, Drew, Grant, and Saline Counties); Little River (Little River and Sevier Counties); Middle Fork Little River (Van Buren County); White River (Arkansas, Independence, Jackson, Monroe, White, and Woodruff Counties); Black River (Lawrence and Randolph Counties); Spring River (Lawrence, Randolph, and Sharp Counties); South Fork Spring River (Fulton County); Strawberry River (Izard, Lawrence, and Sharp Counties); and Buffalo River (Newton and Searcy Counties) (USFWS 2012).

Of these waterbodies designated as proposed critical habitat, two are in counties crossed by the Project: (Arkansas) Middle Fork Little River and White River (USFWS 2012). The Middle Fork Little River includes 14.5 rmi of the Middle Fork Little River from the confluence of Little Tick Creek north of Shirley, Arkansas, downstream to Greers Ferry Reservoir where inundation begins in Van Buren County. The White River includes 117 rmi of the White River from the Batesville Dam at Batesville, Independence County, Arkansas, downstream to the Little Red River confluence north of Georgetown, White, and Woodruff Counties, Arkansas. Jackson County is also listed under the White River proposed critical habitat unit (USFWS 2012). Proposed critical habitat includes only stream channels within the OHWM, and does not include developed areas flooded by lakes and reservoirs. The USFWS has drafted an Environmental Assessment for the designation of the critical habit for this species (USFWS 2013c). A final determination on the proposed critical habitat is expected in 2014 (USFWS 2013d).

5.9.1 Natural History

Range

Historically, the rabbitsfoot was very wide-ranging and known from 139 streams in 15 states (USFWS 2011). Populations of the rabbitsfoot are still known from 49 streams in 13 states (see Figure 5.9-1, "Potential Presence of Rabbitsfoot in the Action Area") (USFWS 2010, 2014):

- Alabama: Paint Rock River, Bear Creek;
- Arkansas: White River, War Eagle Creek, Buffalo River, Black River, Current River, Spring River, South Fork Spring River, Strawberry River, Middle Fork Little Red River, Illinois River, Cossatot River, Little River, Ouachita River, Little Missouri River, Saline River;
- Illinois: Ohio River, North Fork Vermilion River, Middle Branch North Fork Vermilion River;
- Indiana: Ohio River, Eel River, Tippecanoe River;
- Kansas: Neosho River, Spring River;

- Kentucky: Ohio River, South Fork Kentucky River, Green River, Barren River, Rough River, Red River, Tennessee River;
- Louisiana: Bayou Bartholomew;
- Mississippi: Bear Creek, Big Sunflower River, Big Black River;
- Missouri: St. Francis River, Spring River (Arkansas River system);
- Ohio: Fish Creek, Walhonding River, Killbuck Creek, Big Darby Creek, Little Darby Creek;
- Oklahoma: Illinois River, Little River, Glover River, Verdigris River;
- Pennsylvania: Allegheny River, French Creek, Muddy Creek, LeBoeuf Creek, Conneautee Creek; and
- Tennessee: East Fork Stones River, Red River, Tennessee River, Elk River, Duck River.

Habitat

The rabbitsfoot preferred habitat includes small to medium sized streams and, less often, larger rivers (USFWS 2012). It is typically found in shallower water along banks and shoals where the flow rate is low but adjacent to a moderate current (Roe 2002; Fobian 2007). While Fobian (2007) found the rabbitsfoot in the Spring River, Black River, and Little River used water depths from 4 inches to 7 feet deep, specimens have also been reported from 9 to 12 feet of water (USFWS 2011, 2012). Preferred substrate includes gravel and sand; however, this species seldom burrows and usually lies on its side on the stream/river bottom (Roe 2002; USFWS 2011).

Breeding

The rabbitsfoot reaches sexual maturity at four to six years (Fobian 2007). It is a tachytictic spawner with females brooding between May and late August. Gravid females have been observed moving to shallower water to release their glochidia offspring, a strategy to increase fish host exposure. During the glochidia phase, the rabbitsfoot are gill parasites and attach to the gills of the host fish, feeding on host fluids, before developing into a shelled juvenile mussel (Fobian 2007; USFWS 2014). Lab tests have confirmed suitable fish hosts for the rabbitsfoot glochidia include blacktail shiner (*Cyprinella venusta*), cardinal shiner (*Luxilus cardinalis*), red shiner (*Cyprinella lutrensis*), spotfin shiner (*Cyprinella spiloptera*), and bluntface shiner (*Cyprinella camura*) (Fobian 2007). Other populations of rabbitsfoot have been found to use fish hosts from rosyface shiner (*Notropis rubellus*), striped shiner (*Luxilus chrysocephalus*), and emerald shiner (*Notropis atherinoides*).

The rabbitsfoot, like other freshwater mussel species, complete their transformation from glochidia to shelled, burrowing juveniles in approximately two to four weeks depending on rabbitsfoot population, fish host, and stream temperature (Fobian 2007). Once the rabbitsfoot develops into an adult, this species is ready to breed through indirect fertilization; meaning the males discharge sperm into the water column, which moves with the current (Fobian 2007; USFWS 2014). Females draw in sperm by way of siphoning water.

Feeding

Like most freshwater mussels, the rabbitsfoot is a filter feeder. Freshwater mussels have gills modified to trap food particles (algal detritus and/or microorganisms) that are in the water column and move with the current (Ruppert and Barnes 1994; USFWS 2014). Mussels also gather unwanted toxins from the water as a byproduct of their filter feeding for nutrients (MDC 2002). The gills have multiple filaments and cilia that aid in trapping and transporting food materials back to the digestive organs. Siphons are exposed as rabbitsfoot mussels lie on their sides above the bottom substrate (USFWS 2011).

Locomotion

The rabbitsfoot, like most freshwater mussels, has a compressed, blade-like muscle, known as a "foot," that is used for movement (Ruppert and Barnes 1994). All freshwater mussels use their foot, along with a variety of other muscles within their shell cavity, to move through their environment. Most species use these muscles to burrow down into a preferred substrate. However, the rabbitsfoot is different from many freshwater mussels; instead of burrowing into the substrate, the rabbitsfoot prefers lying on its side above the substrate (USFWS 2011). This characteristic may contribute to this species' ability to be highly mobile compared to other freshwater mussel species (Fobian 2007). Fobian (2007) studied rabbitsfoot populations in Arkansas. This study observed sediment trails 3 to 7 feet in length, and found one individual had moved 5 feet in just a few hours of being disturbed. It was also evident that the study population in Arkansas traveled up and down the bank depending on the summer water levels. Movements are typically in response to environmental stimuli correlated to feeding or breeding. Seasonal migrations have been observed in rabbitsfoot populations; migrating to shallower water during brooding periods (Fobian 2007).

5.9.2 Population Status

Range-wide survey data for this species is lacking, therefore, a conclusive population estimate is not available for the rabbitsfoot. This species has been extirpated from 64% of its historical range of 140 streams and now occurs in only 51 streams (USFWS 2012). This is likely a 90% reduction in the rabbitsfoot overall population (USFWS 2011). The online NatureServe database lists the population at 10,000 to 100,000 (NatureServe 2013).

5.9.3 Current Threats

Factors contributing to the decline of the rabbitsfoot include activities that result in habitat alteration (e.g., impoundments, dredging, channelization) and habitat degradation (e.g., chemical contaminants, mining, sedimentation, oil and natural gas development) (Roe 2002; USFWS 2010, 2012, 2014). Population decline due to impoundments (e.g., dams) is the primary threat among those listed above (USFWS 2012). Impoundments can alter river flow, increase or trap silt loads, change the water quality and temperature, and prevent movement upstream or downstream, all of which can adversely affect filter feeding and reproduction (USFWS 2012, 2014). The rabbitsfoot relies on fish as hosts for the parasitic larval stages of reproduction, and may also depend on host species for upstream movement (USFWS 2011). Shiners of the genera *Cyprinella, Luxilus,* and *Notropis* have been identified as a likely host species (Fobian 2007). Dams and other habitat alterations can inhibit host passage upstream, and consequently affect the distribution of the rabbitsfoot. This can isolate populations, resulting in small, unstable populations more susceptible to extinction. Pollutants can also indirectly affect the rabbitsfoot by killing or reducing the fitness of host fish. Construction activities that could result in impacts on rabbitsfoot habitat in the White and Middle Fork Little Rivers include alterations to hydrology, sedimentation, chemical releases, low-water crossings, and any in-channel work (USFWS 2013f).

5.9.4 Potential Presence in the Action Area

Definition of the Action Area

Clean Line has defined the rabbitsfoot Action Area as the intersection of the project disturbance footprint with the perennial streams known to have extant populations of rabbitsfoot and any proposed critical habitat. To account for any potential effects downstream, the Action Area will extend 100 feet upstream and 300 feet downstream of stream crossings in suitable habitat (USFWS 2014).

Presence in the Action Area Based on Existing Data

The rabbitsfoot is known to occur in tributaries associated with the White River and includes the following counties within the Action Area: (Arkansas) Jackson, Van Buren, and White Counties (USFWS 2010, 2013b). The attached map depicts the range of the rabbitsfoot in proximity to the Project (see Figure 5.9-1, "Potential Presence of Rabbitsfoot in the Action Area"). Additionally, this species is known to occur in the tributaries located within counties adjacent to the Project: (Arkansas) Independence, Lawrence, Newton, Searcy, and Washington Counties (specifically in Verdigris River, Neosho River, Spring River, and Illinois River) (USFWS 2010, 2013e, 2014). In Oklahoma, the rabbitsfoot does not occur within the Project area, but does occur in tributaries located within the adjacent counties of Adair and Cherokee Counties. This species also has the potential to occur in Tennessee, but the range is not near the Project. This species is not known to regularly occur in Texas.

5.9.5 Direct and Indirect Impacts

Direct Mortality/Injury

Clean Line will avoid in-stream work and bank disturbance at occupied crossings. However, if in-stream work is deemed necessary, potential activities during construction may include excavation or travel through water, which could result in individual mussels (if present) being crushed or buried by equipment or personnel. If in-stream work (within the Action Area) is required during construction, Clean Line would coordinate with the USFWS and the appropriate state resource management agencies to determine the need for pre-construction surveys and to identify site-specific measures to avoid or minimize impacts at occupied crossings (see FVW-5 and Section 5.9.6.2, "Species-specific Measures").

Spills of hazardous materials resulting from Project activities, including diesel fuel, gasoline, oil, and hydraulic fluids from construction or O&M equipment, into occupied waterbodies could result in adverse impacts on rabbitsfoot mussels. Even if hazardous materials do not immediately enter aquatic habitats, subsequent rain events or flooding could transport these materials into receiving streams, rivers, or wetlands. Over-spraying of herbicides or off-label use of herbicides (i.e., those not approved for use near aquatic habitats) during noxious and invasive weed control during construction and operations and maintenance could also have direct negative effects on rabbitsfoot mussels. The Project will develop and implement a SWPPP and general EPMs (e.g., refer to W-2, W-3, and W-4 in Section 5.9.6.1, "Environmental Protection Measures") to control sedimentation, erosion, and runoff from disturbed areas which will also avoid and minimize impacts on the rabbitsfoot.

Operations and maintenance activities would include some personnel intermittently accessing the ROW with equipment such as mowers, ATVs, and four-wheel drive trucks; however, there will not be any in-stream work during this phase. Therefore, there will be no direct mortality or injuries to the rabbitsfoot during operations and maintenance. Impacts resulting from decommissioning activities are expected to be the same as those described above for construction, and the same EPMs will be implemented as during the construction phase.

Turbidity

Project-related activities could also result in direct impacts on the rabbitsfoot through sensory disturbances, including noise and ground vibration, which could stir up sediment; Project-related vehicles and equipment in waterbodies could also increase sediment and disrupt the rabbitsfoot filter feeding and breeding mechanisms, by increasing turbidity and altering water levels. In general, these impacts would occur at the time of the disturbances, and any effects on the rabbitsfoot should lessen and dissipate soon thereafter. However, Clean Line will minimize the potential for this impact through implementation of EPMs (e.g., refer to FVW-1, W-1, and W-2 in Section 5.9.6.1, "Environmental Protection Measures").

Habitat Loss/Alteration

Project-related activities could result in indirect impacts on freshwater mussels through loss or alteration of sediments suitable for burrowing habitats, and could alter water levels and turbidity, which would impact an individual's ability to filter-feed from the water column above the sediment. Stream benthic disturbances and increased sediment deposition may result in a loss of native plants and substrates that may play ecologically important roles for the rabbitsfoot by moderating stream temperature and providing forage for host fish species. The Project will develop and implement a SWPPP and general EPMs (e.g., refer to GE-3, GEO-1, and W-1 in Section 5.9.6.1, "Environmental Protection Measures") to control sedimentation, erosion, and runoff from disturbed areas, which will avoid and minimize impacts on the rabbitsfoot.

Hazardous material spills and the over-spraying of herbicides, or the use of incorrect herbicides (i.e., those not approved for use near aquatic or riparian vegetation) during noxious and invasive weed control could result in short-term degradation of aquatic habitats by damaging or removing native plant species, that could alter the water temperature and stream flow and impact both rabbitsfoot mussels and host fish species. The Project will implement EPMs and species-specific measures designed to avoid or reduce the potential for impacts on habitat from hazardous materials spills and increased sedimentation, including application of refueling and maintenance buffers (see GE-5 and GE-14 in Section 5.9.6.1, "Environmental Protection Measures").

Loss or alteration of aquatic and riparian vegetation could alter habitat in such a way that affects essential life processes for the rabbitsfoot, including reproduction and filter feeding. Loss or degradation of riparian trees and other vegetation on the banks of streams could negatively affect habitat quality by raising water temperatures and increase erosion and sediment loads. Increases in water temperatures and levels of siltation in the water column or on substrates could render habitats unsuitable for essential life processes. For rabbitsfoot mussels, impacts on herbaceous and shrubby vegetation would be short term, while removal of forested vegetation from riparian zones would be long term. Vegetation removal would be minimized by cutting vegetation at a height of no less than 6 feet within a buffer zone 100 feet from the OHWM, except where necessary for access (see Section 5.9.6.2, "Species-specific Measures").

All of the aforementioned impacts could also affect the rabbitsfoot's fish hosts: the blacktail shiner, cardinal shiner, red shiner, spotfin shiner, and bluntface shiner, rosyface shiner, striped shiner, and emerald shiner. Mortality/injury impacts on rabbitsfoot populations would occur if the mussel's host fish were negatively impacted. These impacts are considered temporary and short term, because fish are highly mobile and would most likely avoid areas of disturbance. However, Clean Line would minimize these impacts through EPMs and species-specific measures outlined in Section 5.9.6, "Protection Measures."

Habitat loss or alteration could happen in rabbitsfoot proposed critical habitat where the project crosses the Middle Fork Little River and White River in Arkansas, if project disturbance activities occurred within the OHWM. The proposed critical habitat includes only stream channels within the OHWM, and does not include developed areas flooded by lakes and reservoirs.

Increased Competition

Project-related activities could result in indirect, negative impacts on rabbitsfoot mussels through the introduction of non-native aquatic plant and wildlife species. Introduced non-native plants could alter habitats by outcompeting and replacing native plants essential to this species or its host fish species, which could, in turn, alter stream temperatures and reduce the rabbitsfoot's ability to feed. Similarly, the introduction of non-native wildlife, such as the zebra mussel, could cause increased competition for food and appropriate sediment for habitat. Zebra mussels may also directly impact native freshwater mussels by attaching to them (MDC 2002). In fact, zebra mussels may attach and kill native mussels (MDC 2002). However, Clean Line will minimize the potential for this impact through implementation of EPMs including FVW-2 (see Section 5.9.6.1, "Environmental Protection Measures") which will identify measures to prevent the spread of non-native species.

5.9.6 Protection Measures

5.9.6.1 Environmental Protection Measures

The following EPMs—general (GE); soils (GEO); fish, vegetation, and wildlife (FVW); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on the rabbitsfoot:

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits.
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-4) – Vegetation removed during clearing will be disposed of according to federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-9) – Clean Line will avoid and/or minimize damage to drainage features and other improvements such as ditches, culverts, levees, tiles, and terraces; however, if these features or improvements are inadvertently damaged, they will be repaired and or restored.
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies, and groundwater wells, or as otherwise required by federal, state, or local regulations.
- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.
- (GE-23) – Clean Line will maximize the distance between stationary equipment and sensitive noise receptors consistent with engineering design criteria.
- (GE-27) – Clean Line will minimize compaction of soils and rutting through appropriate use of construction equipment (e.g., low ground pressure equipment and temporary equipment mats).

- (GE-28) – Hazardous materials and chemicals will be transported, stored, and disposed of according to federal, state, or local regulations or permit requirements.

Soils Measure:

- (GEO-1) – Clean Line will stabilize slopes exposed by its activities to minimize erosion.

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-2) – Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.

Waters, Wetlands, and Floodplains Measures:

- (W-1) – Clean Line will avoid and/or minimize construction of access roads in special interest waters.
- (W-2) – Clean Line will identify, avoid, and/or minimize adverse effects to wetlands and waterbodies. Clean Line will not place structure foundations within the OHWM of Waters of the United States.
- (W-3) – Clean Line will establish streamside management zones within 50 feet of both sides of intermittent and perennial streams and along margins of bodies of open water where removal of low-lying vegetation is minimized.
- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.
- (W-5) – Clean Line will construct access roads to minimize disruption of natural drainage patterns including perennial, intermittent, and ephemeral streams.
- (W-6) – Clean Line will not construct counterpoise or fiber optic cable trenches across waterbodies.
- (W-7) – Clean Line will locate spoil piles from foundation excavations and fiber optic cable trenches outside of streamside management zones.
- (W-8) – Dewatering will be conducted in a manner designed to prevent soil erosion (e.g., through discharge of water to vegetated areas and/or the use of flow control devices).

5.9.6.2 Species-specific Measures

The Project is expected to span major waterbodies and require no in-stream disturbance where this species is present. However, if rabbitsfoot were to be in an area crossed by the Project, the EPMs listed above (see Section 5.9.6.1, "Environmental Protection Measures") and the additional species-specific measures would all serve to avoid impacts on this species.

In addition to the EPMs described above, species-specific measures based on recommendations from USFWS (2014) would include the following:

- Pre-construction mussel surveys to determine the presence/absence of rabbitsfoot will be performed in waterbody crossings with potential populations of rabbitsfoot, where bank disturbance or in-stream construction activities will occur in Jackson, Van Buren, and White, Arkansas (USFWS 2014);
- Where presence is documented or as determined through consultation with the USFWS, vegetation removal would be minimized by cutting vegetation to a height of no less than 6 feet within a buffer zone 100 feet from the OHWM (i.e., the river buffer zone), except where necessary for access (USFWS 2014);
- If waterbodies with known or presumed presence of rabbitsfoot mussels require in-stream work, then Clean Line will coordinate with the USFWS and applicable state resource agencies to identify site specific minimization measures to avoid impacts.

5.9.7 Effects Determination

The Project will span waterbodies, and it will implement an approved SWPPP and protection measures (see Section 5.9.6, "Environmental Protection Measures") to reduce erosion and chemical spill impacts. Clean Line will avoid in-stream work; however, if in-stream work is necessary in the rabbitsfoot's range, Clean Line will commit to pre-construction surveys, and coordinate with the USFWS and the appropriate state resource management agencies to determine the nature of those surveys and to identify site-specific measures to avoid or minimize impacts at occupied crossings (see FVW-5 and Section 5.9.6.2, "Species-specific Measures"). Additionally, Clean Line will coordinate with the USFWS to ensure the appropriate avoidance or minimization measures are implemented effectively.

Taking into consideration the proposed Project design as well as the implementation of the aforementioned EPMs and species-specific measures proposed by Clean Line, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project "may affect, but is not likely to adversely affect" the rabbitsfoot.

The Project will not conduct in-stream disturbance activity within the OHWM of the Middle Fork Little River or White River in Arkansas, thus the Project "may affect, but is not likely to adversely affect" the proposed critical habitat.

5.10 Scaleshell Mussel

The USFWS listed the scaleshell mussel (*Leptodea leptodon*) as endangered on October 9, 2001 (USFWS 2001). Critical habitat has not been designated for the scaleshell mussel.

5.10.1 Natural History

Range

Historically, the scaleshell mussel range extended throughout much of the Midwestern United States river systems (MDC 2000). This species occurred in 13 states and 56 rivers in the Mississippi River Drainage (USFWS 2010a). However, increased pollution, and loss and alteration of habitat over the last 50 years have reduced the scaleshell mussel range, and the known populations have experienced a 75% reduction (MDC 2000; USFWS 2010a, 2010b). In 2001, this species was known in 14 rivers spanning three states (Missouri, Arkansas, and Oklahoma). However, as of 2010, living specimens have been found only in the Meramec, Bourbeuse, and Gasconade Rivers in Missouri; and dead specimens have recently been found in the Big River in Missouri, Missouri River in South Dakota, and the Kiamichi River in Oklahoma (USFWS 2010a). Figure 5.10-1, "Potential Presence of Scaleshell Mussel in the Action Area" depicts the identified range of the scaleshell mussel in proximity to the Project.

Habitat

The scaleshell mussel is typically found in medium to large rivers with low to medium gradients and good water quality (MDC 2000; Anderson 2006; USFWS 2010a, 2010b). This species prefers clear, unpolluted stable riffles and runs with moderate current velocity. The scaleshell mussel inhabits a variety of substrates, including boulders, cobble, gravel or mud and sand, where it commonly buries itself to a depth of 4 to 5 inches (MDC 2000; USFWS 2010a).

Breeding

The scaleshell mussel exhibits sexual dimorphism; males are larger than females of the same age. In addition, there are differences in the shape of the posterior end of the shell, and females are usually smaller and less tall than males of similar age (USFWS 2010a). This mussel species is known as a bradytictic spawner; spawning occurs in August with females releasing offspring in early summer the following year (MDC 2000). Like all freshwater mussel species, the scaleshell mussel begins life in a larval phase known as a glochidium (MDC 2002). The glochidial phase lasts throughout the winter until the following spring or summer (Baldridge, Christian, and Peck 2007). During this phase, the scaleshell mussel glochidia attach to the gills of the host fish before developing into a shelled juvenile mussel. The glochidial phase is reported to last between two and three weeks when attached to the fish host (Barnhart 2003). The freshwater drum (*Aplodinotus grunniens*) is a suitable host for the scaleshell mussel, and appears to be its exclusive host species (Anderson 2006; USFWS 2010a).

Feeding

Like most freshwater mussels, the scaleshell mussel is a filter feeder (MDC 2000; USFWS 2010a). Freshwater mussels have gills modified to trap food particles (algal detritus and/or microorganisms) that are in the water column and move with the current (Ruppert and Barnes 1994). The gills have multiple filaments and cilia that aid in trapping and transporting food materials back to the digestive organs. Siphons are exposed above the burrow location, and play a role in the feeding process as well.

Locomotion

Like most freshwater mussels, the scaleshell mussel has a compressed, blade-like muscle, known as a "foot," that is used for movement (Ruppert and Barnes 1994). All freshwater mussels use their foot, along with a variety of other muscles within their shell cavity, to move through their environment and to burrow down into a preferred substrate. In most instances, the only movements made by freshwater mussels are vertical motions to adjust the position within the substrate burrow (Smith 2013). These vertical movements are typically in response to environmental stimuli correlated to feeding or breeding to make sure the mussel's position in the substrate allows it to access the water column (USFWS 2010a).

5.10.2 Population Status

Due to its rarity, no current or historical population estimate is available for the scaleshell mussel (USFWS 2010b). However, over the last 50 years the scaleshell mussel population has experienced a 75% reduction (MDC 2000; USFWS 2010a, 2010b). Of the 78 extant scaleshell mussel sites in 2001, 21 sites have been resurveyed in Missouri and Oklahoma. Of these 21 sites, 13 sites have completely disappeared or had significant population declines (USFWS 2010a). The exact causes of these declines are unknown, but the lack of any mussels at these sites is an indication that these areas no longer provide suitable habitat.

5.10.3 Current Threats

The most serious threat to the scaleshell mussel is destruction and alteration of its habitat (MDC 2000; USFWS 2010a). Primary threats to habitat include water quality degradation, channelization, sand and gravel mining, dredging, sedimentation, and impoundment (e.g., dams; MDC 2002; Anderson 2006; USFWS 2010a). Impoundments can cause aquatic habitats to flood, reducing gravel substrate and potentially limiting the distribution of fish hosts needed for larval mussel development, including scaleshell mussel larvae (MDC 2002; USFWS 2010a). Changes in water temperature from impoundments can also be a limiting factor to reproduction in freshwater mussel species, including the scaleshell mussel (Heinricher and Layzer 1999). Increased silt loads into riverine habitats can impair the ability of freshwater mussels, like the scaleshell mussel, to filter feed and can even bury individuals (MDC 2002; USFWS 2010c). Construction activities could result in impacts on scaleshell mussel habitat. Construction activities can require water withdrawals, other alterations to hydrology, low-water crossings, and in-channel work, all of which has the potential to impact scaleshell mussel individuals and habitat (USFWS 2013c).

5.10.4 Potential Presence in the Action Area

Definition of the Action Area

The scaleshell mussel Action Area has been defined as the intersection of the project disturbance footprint with the perennial streams in Crawford, Cross, Franklin, Jackson, Mississippi, Poinsett, and White Counties, Arkansas (see Figure 5.10-1, "Potential Presence of Scaleshell Mussel in the Action Area"). To account for any the potential of sedimentation and chemical spill contamination, the Action Area will extend 100 feet upstream and 300 feet downstream of stream crossings in suitable habitat (USFWS 2014).

Presence in the Action Area Based on Existing Data

The range for the scaleshell mussel includes the following counties within the Project area: (Arkansas) Crawford, Cross, Franklin, Jackson, Mississippi, Poinsett, and White (USFWS 2013a, 2013b). Within the Project Action Area, scaleshell mussels have been documented in the St. Francis, Arkansas, and White Rivers, and additional river locations as applicable, but observed occurrences have been limited to a small number of individuals or a single specimen (live or dead) collected during one or more extensive mussel surveys of these rivers (USFWS 2010a).

5.10.5 Direct and Indirect Impacts

Direct Mortality/Injury

Clean Line will avoid in-stream work and bank disturbance at occupied crossings. However, if in-stream work is deemed necessary, potential activities during construction may include excavation or travel through water, which could result in individual mussels (if present) being crushed or buried by equipment or personnel. If in-stream work (within the Action Area) is required during construction, Clean Line would coordinate with the USFWS and the appropriate state resource management agencies to determine the need for pre-construction surveys and to identify site-specific measures to avoid or minimize impacts at occupied crossings (see FVW-5 and Section 5.10.6.2, "Species-specific Measures").

Spills of hazardous materials resulting from Project activities, including diesel fuel, gasoline, oil, and hydraulic fluids from construction or O&M equipment, into occupied waterbodies could result in adverse impacts on scaleshell mussels. Even if hazardous materials do not immediately enter aquatic habitats, subsequent rain events or flooding could transport these materials into receiving streams, rivers, or wetlands. Over-spraying of herbicides or off-label use of herbicides (i.e., those not approved for use near aquatic habitats) during noxious and invasive weed control during construction and operations and maintenance could also have direct negative effects on scaleshell mussels. The Project will develop and implement a SWPPP and general EPMs (e.g., refer to W-2, W-3, and W-4 in Section 5.10.6.1, "Environmental Protection Measures") to control sedimentation, erosion, and runoff from disturbed areas which will also avoid and minimize impacts on the scaleshell mussel. Accidental spills of hazardous materials will be immediately contained and properly cleaned up with on-site spill response kits. In addition, the Project will implement EPMs and species-specific measures designed to avoid or reduce the potential for impacts on habitat from hazardous materials spills and stormwater pollution, including application of refueling and maintenance buffers (GE-14), herbicide use standards (GE-5), and use of proper erosion control devices (GEO-1).

Operations and maintenance activities would include some personnel intermittently accessing the ROW with equipment such as mowers, ATVs, and four-wheel drive trucks; however, there will not be any in-stream work during this phase. Therefore, there will be no direct mortality or injuries to scaleshell mussels during operations and maintenance. Impacts resulting from decommissioning activities are expected to be the same as those described above for construction, and the same species-specific measures will be implemented as during the construction phase.

Turbidity

Project-related activities could also result in direct impacts on the scaleshell mussel through sensory disturbances, including noise and ground vibration, which could stir up sediment. Project-related vehicles and equipment in waterbodies could also increase sediment and disrupt scaleshell mussel filter feeding and breeding mechanisms, by increasing turbidity and altering water levels. In general, these impacts would occur at the time of the disturbances, and any effects on the scaleshell mussel should lessen and dissipate soon thereafter. However, Clean Line will minimize the potential for this impact through implementation of EPMs (e.g., refer to FVW-1, W-1, and W-2 in Section 5.10.6.1, "Environmental Protection Measures").

Habitat Loss/Alteration

Project-related activities could result in indirect impacts on freshwater mussels through loss or alteration of sediments suitable for burrowing habitats, and could alter water levels and turbidity, which would impact an individual's ability to filter-feed from the water column above the sediment. Stream benthic disturbances and increased sediment deposition may result in a loss of native plants and substrates that may play ecologically important roles for the scaleshell mussel by moderating stream temperature and providing forage for host fish species. The Project will develop and implement a

SWPPP and general EPMs (e.g., refer to GE-3, GEO-1, and W-1in Section 5.10.6.1, "Environmental Protection Measures") to control sedimentation, erosion, and runoff from disturbed areas, which will avoid and minimize impacts on the scaleshell mussel.

Hazardous material spills and the over-spraying of herbicides, or the use of incorrect herbicides (i.e., those not approved for use near aquatic or riparian vegetation) during noxious and invasive weed control could result in short-term degradation of aquatic habitats by damaging or removing native plant species, that could alter the water temperature and stream flow and impact both scaleshell mussels and host fish species. The Project will implement EPMs and species-specific measures during all Project activities designed to avoid or reduce the potential for impacts on habitat from hazardous materials spills and increased sedimentation, including application of refueling and maintenance buffers (see GE-5 and GE-14 in Section 5.10.6.1, "Environmental Protection Measures").

Loss or alteration of aquatic and riparian vegetation could alter habitat in such a way that affects essential life processes for the scaleshell mussel, including reproduction, filter feeding, and burrowing. Loss or degradation of riparian trees and other vegetation on the banks of streams could negatively affect habitat quality by raising water temperatures and increase erosion and sediment loads. Increases in water temperatures and levels of siltation in the water column or on substrates could render habitats unsuitable for essential life processes. For scaleshell mussels, impacts on herbaceous and shrubby vegetation would be short term, while removal of forested vegetation from riparian zones would be long term. Vegetation removal would be minimized by cutting vegetation at a height of no less than 6 feet within a buffer zone 100 feet from the OHWM, except where necessary for access (see Section 5.10.6.2, "Species-specific Measures").

All of the aforementioned impacts could also affect the scaleshell mussel's fish host, the freshwater drum. Mortality/injury impacts on scaleshell mussel populations would occur if the mussel's host fish were negatively impacted. These impacts are considered temporary and short term because fish are highly mobile and would most likely avoid areas of disturbance. However, Clean Line will minimize the potential for these impacts through EPMs and species-specific measures outlined in Section 5.10.6, "Protection Measures."

Increased Competition

Project-related activities could result in indirect adverse impacts on scaleshell mussels through the introduction of non-native aquatic plant and wildlife species. Introduced non-native plants could alter habitats by outcompeting and replacing native plants essential to this species or its host fish species, which could, in turn, alter stream temperatures and reduce the scaleshell mussel's ability to feed. Similarly, the introduction of non-native wildlife, such as the zebra mussel, could cause increased competition for food and appropriate sediment for habitat. Zebra mussels may also directly impact native freshwater mussels by attaching to them (MDC 2002). In fact, zebra mussels may attach and kill native mussels (MDC 2002). However, Clean Line will minimize the potential for this impact through implementation of EPMs including FVW-2 (see Section 5.10.6.1, "Environmental Protection Measures") which will identify measures to prevent the spread of non-native species.

5.10.6 Protection Measures

Clean Line will use a number of measures to avoid or minimize impacts on the scaleshell mussel. These measures are described below and include EPMs and species-specific measures.

5.10.6.1 Environmental Protection Measures

The following EPMs—general (GE); soils (GEO); fish, vegetation, and wildlife (FVW); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on scaleshell mussel.

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits.
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-4) – Vegetation removed during clearing will be disposed of according to federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-9) – Clean Line will avoid and/or minimize damage to drainage features and other improvements such as ditches, culverts, levees, tiles, and terraces; however, if these features or improvements are inadvertently damaged, they will be repaired and or restored.
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies, and groundwater wells, or as otherwise required by federal, state, or local regulations.
- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.
- (GE-23) – Clean Line will maximize the distance between stationary equipment and sensitive noise receptors consistent with engineering design criteria.
- (GE-27) – Clean Line will minimize compaction of soils and rutting through appropriate use of construction equipment (e.g., low ground pressure equipment and temporary equipment mats).
- (GE-28) – Hazardous materials and chemicals will be transported, stored, and disposed of according to federal, state, or local regulations or permit requirements.

Soils EPM:

- (GEO-1) – Clean Line will stabilize slopes exposed by its activities to minimize erosion.

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.

- (FVW-2) – Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.

Waters, Wetlands, and Floodplains EPMs:

- (W-1) – Clean Line will avoid and/or minimize construction of access roads in special interest waters.
- (W-2) – Clean Line will identify, avoid, and/or minimize adverse effects to wetlands and waterbodies. Clean Line will not place structure foundations within the OHWM of Waters of the United States.
- (W-3) – Clean Line will establish streamside management zones within 50 feet of both sides of intermittent and perennial streams and along margins of bodies of open water where removal of low-lying vegetation is minimized.
- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.
- (W-5) – Clean Line will construct access roads to minimize disruption of natural drainage patterns including perennial, intermittent, and ephemeral streams.
- (W-6) – Clean Line will not construct counterpoise or fiber optic cable trenches across waterbodies.
- (W-7) – Clean Line will locate spoil piles from foundation excavations and fiber optic cable trenches outside of streamside management zones.
- (W-8) – Dewatering will be conducted in a manner designed to prevent soil erosion (e.g., through discharge of water to vegetated areas and/or the use of flow control devices).

5.10.6.2 Species-specific Measures

In addition to the EPMs described above, species-specific measures based on recommendations from USFWS (2014) would include the following:

- Pre-construction mussel surveys to determine the presence/absence of scaleshell mussels will be performed in waterbody crossings with potential populations of scaleshell mussels, where bank disturbance or in-stream construction activities will occur in Crawford, Cross, Franklin, Jackson, Mississippi, Poinsett, and White Counties, Arkansas (USFWS 2014);
- Where presence is documented or as determined through consultation with the USFWS, vegetation removal would be minimized by cutting vegetation to a height of no less than 6 feet within a buffer zone 100 feet from the OHWM (i.e., the river buffer zone), except where necessary for access (USFWS 2014);

- If waterbodies with known or presumed presence of scaleshell mussels require in-stream work, then Clean Line will coordinate with the USFWS and applicable state resource agencies to identify site-specific minimization measures to avoid or minimize impacts.

5.10.7 Effects Determination

The Project will span waterbodies and it will implement an approved SWPPP and protection measures (see Section 5.10.6, "Protection Measures") to reduce erosion and chemical spill impacts. Clean Line will avoid in-stream work; however, if in-stream work is necessary in the scaleshell mussel's range, Clean Line will commit to pre-construction surveys, and will coordinate with the USFWS and the appropriate state resource management agencies to determine the nature of those surveys and to identify site-specific measures to avoid or minimize impacts at occupied crossings (see FVW-5 and Section 5.10.6.2, "Species-specific Measures"). Additionally, Clean Line will coordinate with the USFWS to ensure the appropriate avoidance or minimization measures are implemented effectively.

Taking into consideration the proposed Project design as well as the implementation of the aforementioned EPMs and species-specific measures proposed by Clean Line, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project "may affect, but is not likely to adversely affect" the scaleshell mussel.

The scaleshell mussel does not currently have designated critical habitat; therefore, the Project "will not destroy or adversely modify" critical habitat for the species.

5.11 Snuffbox

The USFWS listed the snuffbox (*Epioblasma triquetra*) as endangered on February 14, 2012, with the ruling becoming effective on March 15, 2012 (USFWS 2012). The USFWS has not designated critical habitat for the snuffbox.

5.11.1 Natural History

Range

Historically, the snuffbox was widespread, occurring in Ontario, Canada, and 18 U.S. states (Alabama, Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Mississippi, Missouri, New York, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin) and was known from 210 rivers and lakes (USFWS 2012; NatureServe 2014). By 2012, the snuffbox was known from only 79 rivers and streams across 14 states (no longer in Iowa, Kansas, Mississippi, or New York) and Ontario, Canada (USFWS 2012). The USFWS has not determined the county-by-county presence of snuffbox in Arkansas (USFWS 2014a), but it does report extant populations of snuffbox are known from the Buffalo, Spring, and Strawberry Rivers in the northern part of the state (USFWS 2012). In a technical letter regarding the Project (USFWS 2014b) the USFWS also reports the presence of snuffboxes in Pope County, Arkansas. Other sources report potential snuffbox occurrence in the following 25 Arkansas Counties: Baxter, Benton, Boone, Carroll, Clay, Craighead, Crawford, Crittenden, Cross, Fulton, Greene, Independence, Izard, Lawrence, Lee, Madison, Marion, Mississippi, Newton, Poinsett, Randolph, St. Francis, Searcy, Sharp, and Stone (NatureServe 2014). In Tennessee, the snuffbox is known only from the Clinch, Duck, Elk, and Powell Rivers in central and eastern parts of the state. In addition, it is likely that small populations occur in some of the streams where it is considered extirpated in Arkansas, Tennessee, and other parts of its range (USFWS 2012). Figure 5.11-1, "Snuffbox Range in the Vicinity of the Project," depicts the identified range of the snuffbox in proximity to the Project.

Habitat

The snuffbox typically inhabits riffles with swift current, in small and medium rivers and streams with sandy or stony bottoms (MDC 2000; NatureServe 2014). This mussel inhabits clear water that is a few inches to 2 feet deep (MDC 2000). The snuffbox is also found in Lake Erie and in some larger rivers (USFWS 2012). Adults burrow deep in sand, gravel, or cobble substrates when not spawning or attempting to attract a host fish (USFWS 2012).

Breeding

Some important aspects of the snuffbox life-history requirements remain unknown (USFWS 2012). The snuffbox exhibits sexual dimorphism; males are larger than females of the same age. Like all freshwater mussel species, the snuffbox begins life in a larval phase known as a glochidium (MDC 2002; USFWS 2012). The glochidial phase lasts throughout the winter until the following spring or summer (Baldridge, Christian, and Peck 2007). During this phase, the snuffbox glochidia attach to the gills of the host fish before developing into a shelled juvenile mussel (USFWS 2012). Host fish species of the snuffbox glochidium include Ozark sculpin (*Cottus hypselarus*), blackspotted topminnow (*Fundulus olivaceous*), banded sculpin (*Cottus* caroline), logperch (*Percina caprodes*), blackside darter (*Percina maculate*), and mottled sculpin (Cottus bairdi). After two to four weeks, the newly metamorphosed juveniles drop from the host fish and burrow into the substrate if they land in suitable habitat (MDC 2000).

Feeding

Like most freshwater mussels, the snuffbox is a filter feeder (MDC 2000). Freshwater mussels have gills modified to trap food particles (algal detritus and/or microorganisms) that are in the water column and move with the current (Ruppert and Barnes 1994). The gills have multiple filaments and cilia that aid in trapping and transporting food materials back to the digestive organs. Siphons are exposed above the burrow location, and play a role in the feeding process as well.

Locomotion

Like most freshwater mussels, the snuffbox has a compressed, blade-like muscle, known as a “foot,” that is used for movement (Ruppert and Barnes 1994). All freshwater mussels use their foot, along with a variety of other muscles within their shell cavity, to move through their environment and to burrow down into a preferred substrate. In most instances, the only movements made by freshwater mussels are vertical motions to adjust the position within the substrate burrow (Smith 2013). Adults typically only move to the substrate surface to spawn or to attempt to attract a host fish (USFWS 2012).

5.11.2 Population Status

The snuffbox was historically widespread and locally abundant across its range (USFWS 2102). This species has experienced substantial declines, including the loss of thousands of miles of suitable habitat. Increased pollution and loss and alteration of habitat as a result of rural and urban development have reduced the species’ range and abundance. The USFWS estimates that the total range reductions and population losses for this species may exceed 90%. Today the snuffbox is considered widespread but rare, with remaining populations generally being highly localized, small, and geographically separated from other populations. This species is currently known from only 79 streams in 14 states and Ontario, Canada, and is considered likely to be extirpated from 131 streams where it was previously known (MDC 2000; USFWS 2012). Over 30% of the population accounts for these 79 streams are based on the observations of only one or two live or recently dead individuals. It is possible that unknown populations exist in streams where the snuffbox is thought to be extirpated; however, these populations are likely very small or not viable in the long term (USFWS 2012).

No range-wide studies to accurately estimate the snuffbox population size have been conducted, but NatureServe (2014) lists the population to be 2,500 to 100,000 individuals. The short-term trend is reported as a decline of 10 to 30% and the long-term trend a decline or 30 to 50% (NatureServe 2014).

5.11.3 Current Threats

The most serious threat to the snuffbox is destruction and alteration of its habitat (MDC 2000; USFWS 2012). Primary threats to habitat include water quality degradation, channelization, sand and gravel mining, dredging, sedimentation, and impoundment (e.g., dams) (MDC 2002; USFWS 2012). Impoundments can cause aquatic habitats to flood, reducing gravel substrate and potentially limiting the distribution of fish hosts needed for larval mussel development, including snuffbox larvae (MDC 2002; USFWS 2012). Changes in water temperature from impoundments can also be a limiting factor to reproduction in freshwater mussel species, including the snuffbox (Heinricher and Layzer 1999). Construction activities could result in impacts on snuffbox habitat; increased silt loads into riverine habitats can impair the ability of freshwater mussels, like the snuffbox, to filter feed and can even bury individuals (MDC 2002; USFWS 2012). In addition, construction activities can require alterations to hydrology, low-water crossings, and any in-channel work, all of which has the potential to impact snuffbox individuals and habitat (USFWS 2014b).

5.11.4 Potential Presence in the Action Area

Definition of Action Area

The Action Area for the snuffbox has been defined as the intersection of the project disturbance footprint with perennial streams in Pope, Poinsett, Cross, and Mississippi Counties, Arkansas (see Figure

5.11-1, "Snuffbox Range in the Vicinity of the Project"). To account for impacts from any potential of sedimentation and accidental spills of hazardous materials, the Action Area extends 100 feet upstream and 300 feet downstream of stream crossings in suitable habitat (USFWS 2014b).

Presence in Action Area Based on Existing Data

According to a technical assistance letter sent to Clean Line (USFWS 2014b), the snuffbox may be present in the vicinity of the Project in Pope County, Arkansas, although no specific occupied rivers or streams were provided. In addition, NatureServe (2014) reported that watersheds crossed by the Project in Poinsett, Cross, and Mississippi Counties, Arkansas, also potentially support snuffboxes (NatureServe 2014). Because this species requires flowing water, this analysis assumes presence in all perennial streams in Pope, Poinsett, Cross, and Mississippi Counties, Arkansas, but not in intermittent or ephemeral streams. The snuffbox is also known from the Buffalo, Spring, and Strawberry Rivers in Arkansas; however, these rivers are all located 25 miles or more north of the Project. The Project does not cross rivers or streams in Tennessee with known occurrence of snuffbox, and this species is not known to be present in Oklahoma (USFWS 2012). Figure 5.11-1, "Snuffbox Range in the Vicinity of the Project," depicts the identified range of the snuffbox in the Action Area.

Additional Desktop/Field Analyses

Based on a technical assistance letter regarding the Project (USFWS 2014b), this analysis assumes presence of the snuffbox in the Action Area, defined as perennial rivers and streams in Pope, Poinsett, Cross, and Mississippi Counties, Arkansas. Based on this conservative assumption, no additional desktop analyses or field surveys are planned.

5.11.5 Direct and Indirect Impacts

Direct Mortality/Injury

Clean Line will avoid in-stream work and bank disturbance at occupied crossings. However, if in-stream work is deemed necessary, potential activities during construction may include excavation or travel through water, which could result in individual mussels (if present) being crushed or buried by equipment or personnel. If in-stream work (within the Action Area) is required during construction, Clean Line would coordinate with the USFWS and the appropriate state resource management agencies to determine the need for pre-construction surveys and to identify site-specific measures to avoid or minimize impacts at occupied crossings (see FVW-5 and Section 5.11.6.2, "Species-specific Measures").

Spills of hazardous materials resulting from Project activities, including diesel fuel, gasoline, oil, and hydraulic fluids from construction or O&M equipment, into occupied waterbodies could result in adverse impacts on snuffboxes. Even if hazardous materials do not immediately enter aquatic habitats, subsequent rain events or flooding could transport these materials into receiving streams, rivers, or wetlands. Over-spraying of herbicides or off-label use of herbicides (i.e., those not approved for use near aquatic habitats) during noxious and invasive weed control during construction and operations and maintenance could also have direct negative effects on snuffboxes. The Project will develop and implement a SWPPP and general EPMs (e.g., refer to W-2, W-3, and W-4 in Section 5.11.6.1, "Environmental Protection Measures") to control sedimentation, erosion, and runoff from disturbed areas which will also avoid and minimize impacts on the snuffbox.

Operations and maintenance activities would include some personnel intermittently accessing the ROW with equipment such as mowers, ATVs, and four-wheel drive trucks; however, there will not be any in-stream work during this phase. Therefore, there will be no direct mortality or injuries to snuffboxes during operations and maintenance. Impacts resulting from decommissioning activities are expected to be the same as those described above for construction, and the same EPMs will be implemented as during the construction phase.

Turbidity

Project-related activities could also result in direct impacts on the snuffbox through sensory disturbances, including noise and ground vibration, which could stir up sediment. Project-related vehicles and equipment in waterbodies could also increase sediment and disrupt snuffbox filter feeding and breeding mechanisms. In general, these impacts would occur at the time of the disturbances, and any effects on the snuffbox should be minimal. However, Clean Line will avoid or minimize the potential for this impact through EPMs (e.g., refer to FVW-1, W-1, and W-2 in Section 5.11.6.1, "Environmental Protection Measures").

Habitat Loss/Alteration

Project-related activities could result in indirect impacts on freshwater mussels through loss or alteration of sediments suitable for burrowing habitats, and could alter water levels and turbidity, which could impact an individual's ability to filter-feed from the water column above the sediment. Stream benthic disturbances and increased sediment deposition may result in a loss of native plants and substrates that may play ecologically important roles for the snuffbox by moderating stream temperature and providing forage for host fish species. The Project will develop and implement a SWPPP and general EPMs (e.g., refer to GE-3, GEO-1, and W-1 in Section 5.11.6.1, "Environmental Protection Measures") to control sedimentation, erosion, and runoff from disturbed areas which will avoid and minimize impacts on the snuffbox mussel.

Hazardous material spills and the over-spraying of herbicides, or the use of incorrect herbicides (i.e., those not approved for use near aquatic or riparian vegetation), during noxious and invasive weed control could result in short-term degradation of aquatic habitats by damaging or removing native plant species, which could alter the water temperature and stream flow and impact both snuffboxes and host fish species. The Project will implement EPMs and species-specific measures designed to avoid or reduce the potential for impacts on habitat from hazardous materials spills and increased sedimentation, including application of refueling and maintenance buffers (see GE-5 and GE-14 in Section 5.11.6.1, "Environmental Protection Measures").

Loss or alteration of aquatic and riparian vegetation could alter habitat in such a way that affects essential life processes for the snuffbox, including reproduction, filter feeding, and burrowing. Loss or degradation of riparian trees and other vegetation on the banks of streams could negatively affect habitat quality by raising water temperatures and increase erosion and sediment loads. Increases in water temperatures and levels of siltation in the water column or on substrates could render habitats unsuitable for essential life processes. For snuffboxes, impacts on herbaceous and shrubby vegetation would be short term, while removal of forested vegetation from riparian zones would be long term. Vegetation removal would be minimized by cutting vegetation at a height of no less than 6 feet within a buffer zone 100 feet from the OHWM, except where necessary for access (see Section 5.11.6.2, "Species-specific Measures").

All of the aforementioned impacts could also affect the snuffbox's fish hosts: Ozark sculpin, blackspotted topminnow, banded sculpin, logperch, blackside darter, and mottled sculpin. Mortality/injury impacts on snuffbox populations would occur if the mussel's host fish were negatively impacted. These impacts would be temporary or short term, because fish are highly mobile and would most likely avoid areas of disturbance. However, the Project will minimize the potential for this impact through EPMs and species-specific measures outlined in Section 5.11.6, "Protection Measures."

Increased Competition

Project-related activities could result in indirect adverse impacts on snuffboxes through the introduction of non-native aquatic plant and wildlife species. Introduced non-native plants could alter habitats by outcompeting and replacing native plants essential to this species or its host fish species, which could, in turn, alter stream temperatures and reduce the snuffbox's ability to feed. Similarly, the introduction of non-native wildlife, such as the zebra mussel, could cause increased competition for food and appropriate sediment for habitat. Zebra mussels may also directly impact native freshwater mussels by attaching to them (MDC 2002). In fact, zebra mussels may attach and kill native mussels (MDC 2002). However, Clean Line will minimize the potential for this impact through implementation of EPMs including FVW – 2 (see Section 5.11.6.1, "Environmental Protection Measures") which will identify measures to prevent the spread of non-native species.

5.11.6 Protection Measures

Clean Line will use a number of measures to avoid or minimize impacts on the snuffbox. These measures are described below and include EPMs and species-specific measures.

5.11.6.1 Environmental Protection Measures

The following EPMs—general (GE); soils (GEO); fish, vegetation, and wildlife (FVW); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on snuffbox.

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits.
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-4) – Vegetation removed during clearing will be disposed of according to federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-9) – Clean Line will avoid and/or minimize damage to drainage features and other improvements such as ditches, culverts, levees, tiles, and terraces; however, if these features or improvements are inadvertently damaged, they will be repaired and or restored.
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies, and groundwater wells, or as otherwise required by federal, state, or local regulations.

- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.
- (GE-23) – Clean Line will maximize the distance between stationary equipment and sensitive noise receptors consistent with engineering design criteria.
- (GE-27) – Clean Line will minimize compaction of soils and rutting through appropriate use of construction equipment (e.g., low ground pressure equipment and temporary equipment mats).
- (GE-28) – Hazardous materials and chemicals will be transported, stored, and disposed of according to federal, state, or local regulations or permit requirements.

Soils Measure:

- (GEO-1) – Clean Line will stabilize slopes exposed by its activities to minimize erosion.

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-2) – Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.

Waters, Wetlands, and Floodplains Measures:

- (W-1) – Clean Line will avoid and/or minimize construction of access roads in special interest waters.
- (W-2) – Clean Line will identify, avoid, and/or minimize adverse effects to wetlands and waterbodies. Clean Line will not place structure foundations within the OHWM of Waters of the United States.
- (W-3) – Clean Line will establish streamside management zones within 50 feet of both sides of intermittent and perennial streams and along margins of bodies of open water where removal of low-lying vegetation is minimized.
- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.
- (W-5) – Clean Line will construct access roads to minimize disruption of natural drainage patterns including perennial, intermittent, and ephemeral streams.
- (W-6) – Clean Line will not construct counterpoise or fiber optic cable trenches across waterbodies.

- (W-7) – Clean Line will locate spoil piles from foundation excavations and fiber optic cable trenches outside of streamside management zones.
- (W-8) – Dewatering will be conducted in a manner designed to prevent soil erosion (e.g., through discharge of water to vegetated areas and/or the use of flow control devices).

5.11.6.2 Species-specific Measures

In addition to the EPMs described above, species-specific measures based on recommendations from USFWS (2014b) would include the following:

- Pre-construction mussel surveys to determine the presence/absence of snuffbox mussels will be performed in waterbody crossings with potential populations of snuffbox mussels, where bank disturbance or in-stream construction activities will occur in Pope, Poinsett, Cross, and Mississippi Counties, Arkansas;
- Where presence is documented or as determined through consultation with the USFWS, vegetation removal would be minimized by cutting vegetation to a height of no less than 6 feet within a buffer zone 100 feet from the OHWM (i.e., the river buffer zone), except where necessary for access;
- If waterbodies with known or presumed presence of snuffboxes require in-stream work, the Project will coordinate with the USFWS and applicable state resource agencies to identify site-specific minimization measures to avoid or minimize impacts.

5.11.7 Effects Determination

The Project will span waterbodies, and it will implement an approved SWPPP and protection measures (see Section 5.11.6, “Protection Measures”) to reduce erosion and chemical spill impacts. Clean Line will avoid in-stream work; however, if in-stream work is necessary in the snuffbox’s range, Clean Line will commit to pre-construction surveys, and coordinate with the USFWS and the appropriate state resource management agencies to determine the nature of those surveys and to identify site-specific measures to avoid or minimize impacts at occupied crossings (see FVW-5 and Section 5.11.6.2, “Species-specific Measures”). Additionally, Clean Line will coordinate with the USFWS to ensure the appropriate avoidance or minimization measures are implemented effectively.

Taking into consideration the proposed Project design as well as the implementation of the aforementioned EPMs and species-specific measures proposed by Clean Line, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project “may affect, but is not likely to adversely affect” the snuffbox.

The snuffbox does not currently have designated critical habitat; therefore, the Project “will not destroy or adversely modify” critical habitat for the species.

5.12 Speckled Pocketbook

The USFWS listed the speckled pocketbook (*Lampsilis streckeri*) as an endangered species on February 28, 1989 (USFWS 1989). Critical habitat has not been designated for the speckled pocketbook.

5.12.1 Natural History

Range

Historically, the speckled pocketbook was known from the Little Red River basin in north central Arkansas in Van Buren and Stone Counties (USFWS 1992). A portion of their historical range was inundated by the construction of Greers Ferry Reservoir (USFWS 2006). Including recent survey data compiled by the USFWS between 2004 and 2006, the rediscovery of extant populations of speckled pocketbook has increased its known range in Arkansas' Middle Fork Little Red River (MFLRR) to include the influence of Greers Ferry Reservoir upstream to the confluence of Little Red Creek (63 river miles [rmi]), the South Fork Little Red River extending upstream of Arkansas Highway 95 to near the western boundary of Gulf Mountain WMA and the Ozark National Forest (14 rmi), the Archey Fork from approximately 1 mile upstream of Arkansas Highway 65 to the confluence of Castleberry Creek (16 rmi), the lower Turkey Fork (2 rmi), Beech Fork (11 rmi), and Big Creek (10 rmi) (USFWS 2007). Winterringer (2003) extended the known range within the MFLRR 43 rmi upstream to near Leslie, Arkansas. The speckled pocketbook range within the MFLRR was further extended upstream to near the confluence of Little Red Creek (USFWS 2007). Figure 5.12-1, "Potential Presence of Speckled Pocketbook in the Action Area," depicts the identified range of the speckled pocketbook in proximity to the Project.

Habitat

The speckled pocketbook occurs in coarse sand and sand/gravel bottoms with a constant flow of water (Harris 1993; USFWS 2007). A secondary habitat type occurs in pools with crevices between large rocks and boulders, which have some accumulation of sand/gravel and low water flow velocity (Harris 1993; Winterringer 2003; USFWS 2007). In surveys conducted on the MFLRR in Arkansas, Harris (1993) found speckled pocketbook mussels in a wide variety of current velocities in both pools and riffles; specifically, they were located in riffles with boulder/cobble/gravel/sand substrate, glides with sand/gravel and boulder/cobble, and under slab rock boulders in 13 to 16 inches of water.

Breeding

Like all freshwater mussel species, the speckled pocketbook begins life in a larval phase known as a glochidium (MDC 2002). The speckled pocketbook is known as a bradytictic spawner; spawning occurs in August, with females releasing glochidia in late February through early June the following year (USFWS 2006). This phase lasts throughout the winter until the following spring or summer (Baldridge, Christian, and Peck 2007). During the glochidial phase, the speckled pocketbook encysts on its host fish before developing into a shelled juvenile mussel. The duration of the speckled pocketbook glochidial phase is unknown. The green sunfish (*Lepomis cyanellus*) and other sunfish (*Centrarchidae*) species in the MFLRR are suitable hosts for speckled pocketbook (Winterringer 2003; USFWS 2007).

Feeding

Like most freshwater mussels, the speckled pocketbook is a filter feeder (MDC 2002). Freshwater mussels have gills modified to trap food particles (algal detritus and/or microorganisms) that are in the water column and move with the current (Ruppert and Barnes 1994). Mussels also gather unwanted toxins from the water as a byproduct of their filter feeding for nutrients (MDC 2002). The gills have multiple filaments and cilia that aid in trapping and transporting food materials back to the digestive organs. Siphons are exposed above the burrow location, and play a role in the feeding process as well.

Locomotion

Like most freshwater mussels, the speckled pocketbook has a compressed, blade-like muscle known as a "foot," that is used for movement (Ruppert and Barnes 1994). All freshwater mussels use their foot, along with a variety of other muscles within their shell cavity, to move through their environment and to burrow down into a preferred substrate. In most instances, the only movements made by freshwater mussels are vertical motions to adjust the position within the substrate burrow (Smith 2013). These vertical movements are typically in response to environmental stimuli correlated to feeding or breeding to make sure the mussel's position in the substrate allows it to access the water column (Smith 2013).

5.12.2 Population Status

Harris (1993) found a 1:1 sex ratio for speckled pocketbooks. The total population of speckled pocketbook mussels is estimated at 500 individuals (USFWS 2007). All extant populations appear to be stable. Populations in the Archey and Middle Forks of the Little Red River have documented recruitment and are considered viable. Viability is questionable in the remaining extant populations due to low numbers and lack of evidence verifying recent recruitment.

5.12.3 Current Threats

The most serious threats to the speckled pocketbook are habitat alteration and degradation (Davidson et al. 2007). Water withdrawal for agricultural purposes, unrestricted access to streams by cattle, gravel mining, and increased sedimentation from inadequate riparian buffers during construction projects and eroding stream banks are all sources that are impacting the speckled pocketbook (USFWS 2007). Eroding stream banks are depositing sediment in downstream reaches resulting in a reduction of habitat quantity and quality (Davidson et al. 2007). Impoundments can cause aquatic habitat to flood, reducing gravel substrate and potentially limiting the distribution of fish hosts needed for larval mussel development, including speckled pocketbook larvae (MDC 2002). Changes in water temperature from impoundments can also be a limiting factor to reproduction in freshwater mussel species, including the speckled pocketbook (Heinricher and Layzer 1999). Increased silt loads into riverine habitats can impair the ability of freshwater mussels, like the speckled pocketbook, to filter feed and can even bury individuals (MDC 2002). In addition, turtles and muskrats are known to prey on speckled pocketbooks, and channelization of the lower Archey and South Forks has degraded habitat upstream and downstream of that action (Davidson et al. 2007).

A newer threat to the speckled pocketbook is developing in the upper Little Red River watershed where the Fayetteville Shale is being explored with the introduction of thousands of natural gas wells (Davidson et al. 2007). This development could cause habitat fragmentation, pollution runoff and spills, and has caused increased sedimentation. In 2011 (United States District Court, Eastern District of Arkansas 2011), Hawk Field Services, LLC pleaded guilty to allowing uncontrolled erosion to spill into surrounding waters, causing sedimentation in waters containing the speckled pocketbook in the South Fork, Little Fork, and Archey Fork of the Little Red River, and causing a take of at least one mussel by harassment.

There are also unforeseen threats to speckled pocketbook populations. In one example, creation of an unauthorized dam on private property altered the flow to waters with speckled pocketbook populations (Arkansas News 2014). A private citizen built a 30-foot tall earthen dam across a tributary of the South Fork on the Little Red River in Van Buren County. This tributary supplies water to a section of the river upstream from populations of speckled pocketbook and yellowcheek darter (*Etheostoma moorei*).

5.12.4 Potential Presence in the Action Area

Definition of the Action Area

The speckled pocketbook Action Area has been defined as the intersection of the project disturbance footprint with the perennial streams in Little Red River watershed in north central Arkansas in Van Buren and Cleburne Counties (see Figure 5.12-1, "Potential Presence of Speckled Pocketbook in the Action Area"). To account for any potential contamination, the Action Area will extend 100 feet upstream and 300 feet downstream of stream crossings in suitable habitat (USFWS 2014).

Presence in Action Area Based on Existing Data

The speckled pocketbook mussel is endemic to the Little Red River system in north central Arkansas. Its current range includes the following counties crossed by the Project in Arkansas: Cleburne, Pope, Van Buren, and White (USFWS 2013). Figure 5.12-1, "Potential Presence of Speckled Pocketbook in the Action Area," depicts the speckled pocketbook range in proximity to the Project.

5.12.5 Direct and Indirect Impacts

Direct Mortality/Injury

Clean Line will avoid in-stream work and bank disturbance at occupied crossings. However, if in-stream work is deemed necessary, potential activities during construction may include excavation or travel through water, which could result in individual mussels (if present) being crushed or buried by equipment or personnel. If in-stream work (within the Action Area) is required during construction, Clean Line would coordinate with the USFWS and the appropriate state resource management agencies to determine the need for pre-construction surveys and to identify site-specific measures to avoid or minimize impacts at occupied crossings (see FVW-5 and Section 5.12.6.2, "Species-specific Measures").

Spills of hazardous materials resulting from Project activities, including diesel fuel, gasoline, oil, and hydraulic fluids from construction or O&M equipment, into occupied waterbodies could result in adverse impacts on speckled pocketbook mussels. Even if hazardous materials do not immediately enter aquatic habitats, subsequent rain events or flooding could transport these materials into receiving streams, rivers, or wetlands. Over-spraying of herbicides or off-label use of herbicides (i.e., those not approved for use near aquatic habitats) during noxious and invasive weed control during construction and operations and maintenance could also have direct negative effects on speckled pocketbook mussels. The Project will develop and implement a SWPPP and general EPMs (e.g., refer to W-2, W-3, and W-4 in Section 5.12.6.1, "Environmental Protection Measures") to control sedimentation, erosion, and runoff from disturbed areas which will also avoid and minimize impacts on the speckled pocketbook. Accidental spills of hazardous materials will be immediately contained and properly cleaned up with on-site spill response kits. In addition, the Project will implement EPMs and species-specific measures designed to avoid or reduce the potential for impacts on habitat from hazardous materials spills and stormwater pollution, including application of refueling and maintenance buffers (GE-14); herbicide use standards (GE-5); and use of proper erosion control devices (GEO-1).

Operations and maintenance activities would include some personnel intermittently accessing the ROW with equipment such as mowers, ATVs, and four-wheel drive trucks; however, there will not be any in-stream work during this phase. Therefore, there will be no direct mortality or injuries to speckled pocketbook during operations and maintenance. Impacts resulting from decommissioning activities are expected to be the same as those described above for construction, and the same EPMs will be implemented as during the construction phase.

Turbidity

Project-related activities could also result in direct impacts on the speckled pocketbook through sensory disturbances, including noise and ground vibration, which could stir up sediment. Project-related vehicles and equipment in waterbodies could also increase sediment and disrupt speckled pocketbook filter feeding and breeding mechanisms, by increasing turbidity and altering water levels. In general, these impacts would occur at the time of the disturbances, and any effects on the speckled pocketbook should lessen and dissipate soon thereafter. However, Clean Line will minimize the potential for this impact through EPMs (e.g., refer to FVW-1, W-1, and W-2 in Section 5.12.6.1, “Environmental Protection Measures”).

Habitat Loss/Alteration

Project-related activities could result in indirect impacts on freshwater mussels through loss or alteration of sediments suitable for burrowing habitats, and could alter water levels and turbidity, which would impact an individual’s ability to filter-feed from the water column above the sediment. Stream benthic disturbances and increased sediment deposition may result in a loss of native plants and substrates that may play ecologically important roles for the speckled pocketbook by moderating stream temperature and providing forage for host fish species. The Project will initiate an approved SWPPP and general EPMs that will also prevent erosion and pollution spills (see Section 5.12.6.2, “Species-specific Measures”) to avoid and minimize impacts on the speckled pocketbook. The Project will develop and implement a SWPPP and general EPMs (e.g., refer to GE-3, GEO-1, and W-1 in Section 5.12.6.1) to control sedimentation, erosion, and runoff from disturbed areas, which will avoid and minimize impacts on the speckled pocketbook.

Hazardous material spills and the over-spraying of herbicides, or the use of incorrect herbicides (i.e., those not approved for use near aquatic or riparian vegetation) during noxious and invasive weed control could result in short-term degradation of aquatic habitats by damaging or removing native plant species, that could alter the water temperature and stream flow and impact both speckled pocketbook mussels and host fish species. The Project will implement EPMs and species-specific measures designed to avoid or reduce the potential for impacts on habitat from hazardous materials spills and increased sedimentation, including application of refueling and maintenance buffers (see GE-5 and GE-14 in Section 5.12.6.1, “Environmental Protection Measures”).

Loss or alteration of aquatic and riparian vegetation could alter habitat in such a way that affects essential life processes for the speckled pocketbook, including reproduction, filter feeding, and burrowing. Loss or degradation of riparian trees and other vegetation on the banks of streams could negatively affect habitat quality by raising water temperatures and increasing erosion and sediment loads. Increases in water temperatures and levels of silt in the water or on substrates could render habitats unsuitable for essential life processes. For speckled pocketbook mussels, impacts on herbaceous and shrubby vegetation would be short term, while removal of forested vegetation from riparian zones would be long term. Vegetation removal would be minimized by cutting vegetation at a height of no less than 6 feet within a buffer zone 100 feet from the OHWM, except where necessary for access (see 5.12.6.2, “Species-specific Measures”).

All of the aforementioned impacts could also affect the speckled pocketbook’s sunfish hosts (*Centrarchidae*). Mortality/injury impacts on speckled pocketbook populations would occur if the mussel’s host fish were negatively impacted. These impacts are considered temporary and short term because fish are highly mobile and would most likely avoid areas of disturbance. However, Clean Line will minimize the potential for these impacts through EPMs and species-specific measures outlined in Section 5.12.6.

Increased Competition

Project-related activities could result in indirect, negative impacts on speckled pocketbook mussels through the introduction of non-native aquatic plant and wildlife species. Introduced non-native plants could alter habitats by outcompeting and replacing native plants essential to this species or its host fish species, which could, in turn, alter stream temperatures and reduce the speckled pocketbook's ability to feed. Similarly, the introduction of non-native wildlife, such as the zebra mussel, could cause increased competition for food and appropriate sediment for habitat. Zebra mussels may also directly impact native freshwater mussels by attaching to them (MDC 2002). In fact, zebra mussels may attach and kill native mussels (MDC 2002). However, Clean Line will minimize the potential for this impact through implementation of EPMs including FVW-2 (see Section 5.12.6.1, "Environmental Protection Measures") which will identify measures to prevent the spread of non-native species.

5.12.6 Protection Measures

Clean Line will use a number of measures to avoid or minimize impacts on the speckled pocketbook. These measures are described below and include EPMs and species-specific measures described.

5.12.6.1 Environmental Protection Measures

The following EPMs—general (GE); soils (GEO); fish, vegetation, and wildlife (FVW); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on speckled pocketbook.

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits.
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-4) – Vegetation removed during clearing will be disposed of according to federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-9) – Clean Line will avoid and/or minimize damage to drainage features and other improvements such as ditches, culverts, levees, tiles, and terraces; however, if these features or improvements are inadvertently damaged, they will be repaired and or restored.
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.

- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies, and groundwater wells, or as otherwise required by federal, state, or local regulations.
- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.
- (GE-23) – Clean Line will maximize the distance between stationary equipment and sensitive noise receptors consistent with engineering design criteria.
- (GE-27) – Clean Line will minimize compaction of soils and rutting through appropriate use of construction equipment (e.g., low ground pressure equipment and temporary equipment mats).
- (GE-28) – Hazardous materials and chemicals will be transported, stored, and disposed of according to federal, state, or local regulations or permit requirements.

Soils Measure:

- (GEO-1) – Clean Line will stabilize slopes exposed by its activities to minimize erosion.

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-2) – Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.

Waters, Wetlands, and Floodplains Measures:

- (W-1) – Clean Line will avoid and/or minimize construction of access roads in special interest waters.
- (W-2) – Clean Line will identify, avoid, and/or minimize adverse effects to wetlands and waterbodies. Clean Line will not place structure foundations within the OHWM of Waters of the United States.
- (W-3) – Clean Line will establish streamside management zones within 50 feet of both sides of intermittent and perennial streams and along margins of bodies of open water where removal of low-lying vegetation is minimized.
- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.
- (W-5) – Clean Line will construct access roads to minimize disruption of natural drainage patterns including perennial, intermittent, and ephemeral streams.

- (W-6) – Clean Line will not construct counterpoise or fiber optic cable trenches across waterbodies.
- (W-7) – Clean Line will locate spoil piles from foundation excavations and fiber optic cable trenches outside of streamside management zones.
- (W-8) – Dewatering will be conducted in a manner designed to prevent soil erosion (e.g., through discharge of water to vegetated areas and/or the use of flow control devices).

5.12.6.2 Species-specific Measures

In addition to the EPMs described above, species-specific measures based on recommendations from USFWS (2014) would include the following:

- Pre-construction mussel surveys to determine the presence/absence of speckled pocketbook mussels will be performed in waterbody crossings with potential populations of speckled pocketbook mussels, where bank disturbance or in-stream construction activities will occur in Crawford, Cross, Franklin, Jackson, Mississippi, Poinsett, and White, Counties, Arkansas (USFWS 2014);
- Where presence is documented or as determined through consultation with the USFWS, vegetation removal would be minimized by cutting vegetation to a height of no less than 6 feet within a buffer zone 100 feet from the OHWM (i.e., the river buffer zone), except where necessary for access (USFWS 2014);
- If waterbodies with known or presumed presence of speckled pocketbook require in-stream work, then Clean Line will coordinate with the USFWS and applicable state resource agencies to identify site-specific minimization measures to avoid or minimize impacts.

5.12.7 Effects Determination

The Project will span waterbodies and it will implement an approved SWPPP and protection measures (see Section 5.12.6, "Protection Measures") to reduce erosion and chemical spill impacts. Clean Line will avoid in-stream work; however, if in-stream work is necessary in the speckled pocketbook's range, Clean Line will commit to pre-construction surveys, and coordinate with the USFWS and the appropriate state resource management agencies to determine the nature of those surveys and to identify site-specific measures to avoid or minimize impacts at occupied crossings (see FVW-5 and Section 5.12.6.2, "Species-specific Measures"). Additionally, Clean Line will coordinate with the USFWS to ensure the appropriate avoidance or minimization measures are implemented effectively.

Taking into consideration the proposed Project design as well as the implementation of the aforementioned EPMs and species-specific measures proposed by Clean Line, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project "may affect, but is not likely to adversely affect" the speckled pocketbook.

The speckled pocketbook does not currently have designated critical habitat; therefore, the Project "will not destroy or adversely modify" critical habitat for the species.

5.13 Spectaclecase

The USFWS listed the spectaclecase mussel (*Cumberlandia monodonta*) as endangered on April 12, 2012 (USFWS 2014a). Critical habitat has not been designated for the spectaclecase mussel.

5.13.1 Natural History

Range

Historically, the spectaclecase ranged through the Mississippi, Ohio, and Missouri River basins; it was known from 44 streams in 14 states (Baird 2000; Posey and Irwin 2012; USFWS 2014a). Currently, the spectaclecase is extant in 20 streams (55% reduction) in 11 states: Alabama, Arkansas, Illinois, Iowa, Kentucky, Minnesota, Missouri, Tennessee, Virginia, West Virginia, and Wisconsin (USFWS 2014a). The largest populations are those in the Meramec and Gasconade Rivers in Missouri, and the St. Croix River in Minnesota and Wisconsin. The Ouachita River in Arkansas and the Green River in Kentucky both have relatively large spectaclecase populations. Figure 5.13-1, “Potential Presence of Spectaclecase in the Action Area,” depicts the identified range of the spectaclecase in proximity to the Project.

Habitat

The spectaclecase is a large mussel (5 to 9 inches) that depends on medium to large rivers with microhabitat areas of reduced current adjacent to, but sheltered from, the interface of swift sections (MDC 2002; Posey and Irwin 2012; USFWS 2014a). Whereas most mussel species congregate in multi-species groups, the spectaclecase is a rocky microhabitat specialist usually found in single-species groups, with as many as 100 individuals per square yard (MDC 2002) and up to 120 individuals per square yard in Missouri (Baird 2000). The spectaclecase prefers patches of sand, gravel and cobble located among boulders (Baird 2000; Posey and Irwin 2012; USFWS 2014a). In Arkansas, spectaclecase mussels inhabit rocky microhabitats; generally in silt or fine gravel substrate underneath ledges or large rocks in moderate to fast currents (Posey and Irwin 2012). The species can also occasionally be found under or adjacent to large sunken logs.

Breeding

Currently, little is known about the life history of spectaclecase mussels. Studies have found that populations have sex ratios close to 50:50, and sexual maturity for both sexes is estimated between four and seven years (Baird 2000). Average ages of spectaclecase mussels appear to be between 20 and 35 years, with the oldest known specimens recorded at 56 and 70 years (Baird 2000; USFWS 2014a). Like all freshwater mussel species, the spectaclecase begins life in a larval phase known as a glochidium (MDC 2002). During this phase, spectaclecase glochidia attach to the gills of the host fish before developing into a shelled juvenile mussel. While host species for many North American freshwater mussel species are known, the host fish for spectaclecase has eluded researchers. From multiple studies that examined more than 60 fish, amphibians, and crayfish species, none appeared to be appropriate hosts for spectaclecase glochidia (Posey and Irwin 2012).

Feeding

Like most freshwater mussels, the spectaclecase mussel is a filter feeder (MDC 2002; USFWS 2012a). Freshwater mussels have gills modified to trap food particles (algal detritus and/or microorganisms) that are in the water column and move with the current (Ruppert and Barnes 1994). The gills have multiple filaments and cilia that aid in trapping and transporting food materials back to the digestive organs. Siphons are exposed above the burrow location, and play a role in the feeding process as well.

Locomotion

The spectaclecase mussel has a compressed, blade-like muscle, known as a “foot,” that is used for movement (Ruppert and Barnes 1994). All freshwater mussels use their foot, along with a variety of other muscles within their shell cavity, to move through their environment and to burrow down into a preferred substrate. In most instances, the only movements made by freshwater mussels are vertical motions to adjust the position within the substrate burrow (Smith 2013). These vertical movements are typically in response to environmental stimuli correlated to feeding or breeding to make sure the mussel’s position in the substrate allows it to access the water column (USFWS 2014b).

5.13.2 Population Status

No current population estimates exist for the spectaclecase. Spectaclecase population size is difficult to assess due to the wide range of this species, and the fact that there are no accurate assessments of populations at any site. The spectaclecase is a microhabitat specialist, inhabiting rocky areas with ledges or ledge rocks with voids underneath that contain silt or fine gravel substrate in moderate to fast current. Given this habitat, dive lights are needed to effectively search for the spectaclecase. Combined with the fact that several recent reports are based on finds of single mussels, few specimens have been found (Posey and Irwin 2012).

5.13.3 Current Threats

Changes to hydrological regimes are the most serious threat to the spectaclecase and can result from dam operations and other water diversion activities (USFWS 2012a, 2014a). These impoundments affect both upstream and downstream populations by altering seasonal flow patterns, changing temperatures, scouring river bottoms and eliminating river habitat (USFWS 2012a). Many former populations have been lost due to dam construction for the creation of large reservoirs, which eliminated the swift flowing water this species requires (USFWS 2014a). Sources of habitat destruction include waterbody channel alteration/maintenance, pollution from municipal and industrial sources, mining activities, oil and gas developments, population fragmentation and isolation, climate change and exotic species establishment (e.g., zebra mussel [*Dreissena polymorpha*], Asian clam [*Corbicula fluminea*]) (MDC 2002; USFWS 2012a, 2012b, 2014a; Posey and Irwin 2012). Changes in flow pattern, water temperature, sedimentation, channelization, erosion, destabilization of habitat, less diverse habitats and removal of riparian vegetation are all direct impacts from these sources which are detrimental to the spectaclecase (Posey and Irwin 2012; USFWS 2012a, 2012b, 2014a). Changes in water temperature from impoundments can also be a limiting factor to reproduction in freshwater mussel species, including spectaclecase (Heinricher and Layzer 1999). Increased silt loads into riverine habitats can impair the ability of freshwater mussels, like the spectaclecase, to filter feed and can even bury individuals (MDC 2002).

The spectaclecase relies on fish or other aquatic species as hosts for the parasitic larval stages of reproduction (glochidial phase), and may also depend on host species for upstream movement (USFWS 2012a). Dams and other habitat alterations can inhibit host passage upstream, and consequently affect the movement of the spectaclecase. This can isolate populations, resulting in small, unstable populations more susceptible to extinction. Any potential impacts on host species, including habitat alteration and changes in water quality, could indirectly affect the spectaclecase.

5.13.4 Potential Presence in the Action Area

Definition of the Action Area

The spectaclecase mussel Action Area has been defined as the intersection of the project disturbance footprint with the perennial streams in Johnson and Franklin Counties, Arkansas (USFWS 2013a; USFWS 2013b) (see Figure 5.13-1, "Potential Presence of Spectaclecase in the Action Area"). To account for any potential of sedimentation and chemical spill contamination, the Action Area will extend 100 feet upstream and 300 feet downstream of stream crossings in suitable habitat (USFWS 2014b).

Presence in the Action Area Based on Existing Data

In the Mulberry River in Johnson County, Arkansas, only one confirmed record of spectaclecase has been documented. The nearest record to the Project occurs in the Mulberry River near Cass, Arkansas, in Franklin County (USFWS 2013b). Elsewhere in Arkansas, spectaclecase occur downstream of Remmel Dam (Malvern, Arkansas) in the Ouachita River, which is approximately 60 miles south of the Project (Posey and Irwin 2012).

5.13.5 Direct and Indirect Impacts

Direct Mortality/Injury

Clean Line will avoid in-stream work and bank disturbance at occupied crossings. However, if in-stream work is deemed necessary, potential activities during construction may include excavation or travel through water, which could result in individual mussels (if present) being crushed or buried by equipment or personnel. If in-stream work (within the Action Area) is required during construction, Clean Line would coordinate with the USFWS and the appropriate state resource management agencies to determine the need for pre-construction surveys and to identify site-specific measures to avoid or minimize impacts at occupied crossings (see FVW-5 and Section 5.13.6.2, "Species-specific Measures").

Spills of hazardous materials resulting from Project activities, including diesel fuel, gasoline, oil, and hydraulic fluids from construction or O&M equipment, into occupied waterbodies could result in adverse impacts on spectaclecase mussels. Even if hazardous materials do not immediately enter aquatic habitats, subsequent rain events or flooding could transport these materials into receiving streams, rivers, or wetlands. Over-spraying of herbicides or off-label use of herbicides (i.e., those not approved for use near aquatic habitats) during noxious and invasive weed control during construction and operations and maintenance could also have direct negative effects on spectaclecase mussels. The Project will develop and implement a SWPPP and general EPMs (e.g., refer to W-2, W-3, and W-4 in Section 5.13.6.1, "Environmental Protection Measures") to control sedimentation, erosion, and runoff from disturbed areas, which will also avoid and minimize impacts on the spectaclecase. Accidental spills of hazardous materials will be immediately contained and properly cleaned up with on-site spill response kits. In addition, the Project will implement EPMs and species-specific measures designed to avoid or reduce the potential for impacts on habitat from hazardous materials spills and stormwater pollution, including application of refueling and maintenance buffers (GE-14), herbicide use standards (GE-5), and use of proper erosion control devices (GEO-1).

Operations and maintenance activities would include some personnel intermittently accessing the ROW with equipment such as mowers, ATVs, and four-wheel drive trucks; however, there will not be any in-stream work during this phase. Therefore, there will be no direct mortality or injuries to spectaclecases during operations and maintenance. Impacts resulting from decommissioning activities are expected to be the same as those described above for construction, and the same EPMs will be implemented as during the construction phase

Turbidity

Project-related activities could also result in direct impacts on the spectaclecase through sensory disturbances, including noise and ground vibration, which could stir up sediment. Project-related vehicles and equipment in waterbodies could also increase sediment and disrupt spectaclecase filter feeding and breeding mechanisms, by increasing turbidity and altering water levels. In general, these impacts would occur at the time of the disturbances, and any effects on the spectaclecase should lessen and dissipate soon thereafter. However, Clean Line will minimize the potential for this impact through EPMs (e.g., refer to FVW-1, W-1, and W-2 in Section 5.13.6.1, "Environmental Protection Measures").

Habitat Loss/Alteration

Project-related activities could result in indirect impacts on freshwater mussels through loss or alteration of sediments suitable for burrowing habitats, and could alter water levels and turbidity, which would impact an individual's ability to filter-feed from the water column above the sediment. Stream benthic disturbances and increased sediment deposition may result in a loss of native plants and substrates that may play ecologically important roles for spectaclecase by moderating stream temperature and providing forage for host fish species. The Project will initiate an approved SWPPP and general EPMs (e.g., refer to GE-3, GEO-1, and W-1in Section 5.13.6.1, "Environmental Protection Measures"), which will also prevent erosion and pollution spills to avoid and minimize impacts on the spectaclecase.

Hazardous material spills and the over-spraying of herbicides, or the use of incorrect herbicides (i.e., those not approved for use near aquatic or riparian vegetation) during noxious and invasive weed control could result in short-term degradation of aquatic habitats by damaging or removing native plant species, that could alter the water temperature and stream flow and impact both spectaclecase mussels and host fish species. The Project will implement EPMs and species-specific measures designed to avoid or reduce the potential for impacts on habitat from hazardous materials spills and increased sedimentation, including application of refueling and maintenance buffers (see GE-5 and GE-14 in Section 5.13.6.1, "Environmental Protection Measures").

Loss or alteration of aquatic and riparian vegetation could alter habitat in such a way that affects essential life processes for spectaclecase, including reproduction, filter feeding, and burrowing. Loss or degradation of riparian trees and other vegetation on the banks of streams could negatively affect habitat quality by raising water temperatures and increasing erosion and sediment loads. Increases in water temperatures and levels of siltation in the water column or on substrates could render habitats unsuitable for essential life processes. For spectaclecase mussels, impacts on herbaceous and shrubby vegetation would be short term, while removal of forested vegetation from riparian zones would be long term. Vegetation removal would be minimized by cutting vegetation at a height of no less than 6 feet within a buffer zone 100 feet from the OHWM, except where necessary for access (see Section 5.13.6.2 "Species-specific Measures").

All of the aforementioned impacts could also affect the spectaclecase's fish host. Mortality/injury impacts on spectaclecase populations would occur if the mussel's host fish were negatively impacted. These impacts are considered temporary and short term, because fish are highly mobile and would most likely avoid areas of disturbance. However, Clean Line will minimize the potential for these impacts through EPMs and species-specific measures outlined in Section 5.13.6.2, "Species-specific Measures."

Increased Competition

Project-related activities could result in indirect, negative impacts on spectaclecase mussels through the introduction of non-native aquatic plant and wildlife species. Introduced non-native plants could alter habitats by outcompeting and replacing native plants essential to this species or its host fish species, which could, in turn, alter stream temperatures and reduce the spectaclecase's ability to feed. Similarly, the introduction of non-native wildlife, such as the zebra mussel, could cause increased competition for food and appropriate sediment for habitat. Zebra mussels may also directly impact native freshwater mussels by attaching to them (MDC 2002). In fact, zebra mussels may attach and kill native mussels (MDC 2002). However, Clean Line will minimize the potential for this impact through implementation of EPMs including FVW-2 (see Section 5.13.6.1, "Environmental Protection Measures") which will identify measures to prevent the spread of non-native species.

5.13.6 Protection Measures

Clean Line will use a number of measures to avoid or minimize impacts on spectaclecase mussel. These measures are described below and include EPMs and species-specific measures.

5.13.6.1 Environmental Protection Measures

The following EPMs—general (GE); soils (GEO); fish, vegetation, and wildlife (FVW); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on spectaclecase mussel.

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety, and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits.
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-4) – Vegetation removed during clearing will be disposed of according to federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-9) – Clean Line will avoid and/or minimize damage to drainage features and other improvements such as ditches, culverts, levees, tiles, and terraces; however, if these features or improvements are inadvertently damaged, they will be repaired and or restored.
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies, and groundwater wells, or as otherwise required by federal, state, or local regulations.
- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.

- (GE-23) – Clean Line will maximize the distance between stationary equipment and sensitive noise receptors consistent with engineering design criteria.
- (GE-27) – Clean Line will minimize compaction of soils and rutting through appropriate use of construction equipment (e.g., low ground pressure equipment and temporary equipment mats).
- (GE-28) – Hazardous materials and chemicals will be transported, stored, and disposed of according to federal, state, or local regulations or permit requirements.

Soils EPM:

- (GEO-1) – Clean Line will stabilize slopes exposed by its activities to minimize erosion.

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-2) – Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.

Waters, Wetlands, and Floodplains EPMs:

- (W-1) – Clean Line will avoid and/or minimize construction of access roads in special interest waters.
- (W-2) – Clean Line will identify, avoid, and/or minimize adverse effects to wetlands and waterbodies. Clean Line will not place structure foundations within the OHWM of Waters of the United States.
- (W-3) – Clean Line will establish streamside management zones within 50 feet of both sides of intermittent and perennial streams and along margins of bodies of open water where removal of low-lying vegetation is minimized.
- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.
- (W-5) – Clean Line will construct access roads to minimize disruption of natural drainage patterns including perennial, intermittent, and ephemeral streams.
- (W-6) – Clean Line will not construct counterpoise or fiber optic cable trenches across waterbodies.
- (W-7) – Clean Line will locate spoil piles from foundation excavations and fiber optic cable trenches outside of streamside management zones.
- (W-8) – Dewatering will be conducted in a manner designed to prevent soil erosion (e.g., through discharge of water to vegetated areas and/or the use of flow control devices).

5.13.6.2 Species-specific Measures

In addition to the EPMs described above, species-specific measures based on recommendations from USFWS (2014b) would include the following:

- Pre-construction mussel surveys to determine the presence/absence of spectaclecase mussels will be performed in waterbody crossings with potential populations of spectaclecase mussels, where bank disturbance or in-stream construction activities will occur in Johnson and Franklin Counties, Arkansas (USFWS 2014b);
- Where presence is documented or as determined through consultation with the USFWS, vegetation removal would be minimized by cutting vegetation to a height of not less than 6 feet within a buffer zone 100 feet from the OHWM (i.e., the river buffer zone), except where necessary for access (USFWS 2014);
- If waterbodies with known or presumed presence of spectaclecase mussels require in-stream work, then Clean Line will coordinate with the USFWS and applicable state resource agencies to identify site-specific minimization measures to avoid or minimize impacts.

5.13.7 Effects Determination

The Project will span waterbodies and it will implement an approved SWPPP and protection measures (see Section 5.13.6, "Protection Measures") to reduce erosion and chemical spill impacts. Clean Line will avoid in-stream work; however, if in-stream work is necessary in the spectaclecase's range, Clean Line will commit to pre-construction surveys, and coordinate with the USFWS and the appropriate state resource management agencies to determine the nature of those surveys and to identify site-specific measures to avoid or minimize impacts at occupied crossings (see FVW-5 and Section 5.13.6.2, "Species-specific Measures"). Additionally, Clean Line will coordinate with the USFWS to ensure the appropriate avoidance or minimization measures are implemented effectively.

Taking into consideration the proposed Project design as well as the implementation of the aforementioned EPMs and species-specific measures proposed by Clean Line, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project "may affect, but is not likely to adversely affect" the spectaclecase.

The spectaclecase does not currently have designated critical habitat; therefore, the Project "will not destroy or adversely modify" critical habitat for the species.

5.14 Arkansas Darter

The Arkansas darter (*Etheostoma cragini*) was listed as a candidate for protection under the ESA on November 21, 1991 (USFWS 1991, 2010). The USFWS determined that listing for this species as threatened or endangered was warranted but listing was precluded due to higher-priority listing actions. The Arkansas darter's listing priority number currently is 11, indicating that threats to the species are considered to be of moderate to low magnitude and are non-imminent (USFWS 2013, 2014a).

5.14.1 Natural History

Range

The Arkansas darter was historically broadly distributed throughout a range in the southern great plains and Ozark Plateau that included southwestern Missouri, northwestern Arkansas, northern Oklahoma, southern Kansas, and eastern Colorado (USFWS 2010; Groce 2011; NatureServe 2013). Historical and current records indicate that this species was likely once present continuously between Colorado and Oklahoma and into the Ozark Plateau in Arkansas and Missouri. Today, this species appears to persist in three main geographical areas: three sub-watersheds in the Ozark Plateau in Arkansas, Missouri, and Oklahoma; seven sub-watersheds in southern Kansas and northwestern Oklahoma; and two sub-watersheds in southeastern Colorado (see Figure 5.14-1, "Arkansas Darter Range in the Vicinity of the Project"; USFWS 2010). Near the Project route, the Arkansas darter's occupied range includes only a segment of the Cimarron River and its tributaries (USFWS 2010, 2013).

Habitat

The Arkansas darter is a small member of the perch family that generally occupies shallow, clear, spring-fed tributaries, and cool headwater streams with sand or sandy-gravel substrates (KDWPT 2011; USFWS 2008). Its preferred habitat typically includes pools with sand or pebble substrates or near-shore areas with low water flow, and it is usually associated with abundant aquatic rooted vegetation (USFWS 2010, 2013). Preferred habitats usually require enough sunlight to allow for growth of vascular aquatic plants. Adults often use habitat with undercut banks and aquatic vegetation that protrudes into the stream channel for hunting and predator evasion. Arkansas darters may persist in large, deep water pools in intermittent streams during the late summer dry season (USFWS 2014a).

Feeding

Arkansas darters feed on various aquatic insects and other arthropods as well as some plant materials, including seeds. Mayflies are the main component of its diet (USFWS 2010). They have also been documented to eat snails and fish eggs (Burns and McDonnell Engineering Company, Inc. 2001). Arkansas darters use vegetation for cover when foraging.

Breeding

Arkansas darters can spawn throughout spring and summer from mid-February to mid-July (MDC 2000; USFWS 2010). Spawning occurs in shallow, open water over substrates that vary from silt to coarse gravel. Eggs do not drift in the water; rather, they are usually deposited in open areas on organic material (e.g., in the top inch of organics) that covers a sandy streambed (Burns & McDonnell Engineering Company, Inc. 2001).

5.14.2 Population Status

The Arkansas darter was likely widespread throughout its historical range in sporadic, spring-fed habitats. Accurate estimates of historical population sizes are not available, but in at least one tributary of the Cimarron River (Crooked Creek) in the 1950s and 1960s this species was considered abundant

(USFWS 2010). The current range-wide population is estimated at 2,500 to 10,000 individuals (NatureServe 2013) represented by 12 metapopulations and 164 locality occurrences across five states (USFWS 2010). One of the metapopulations occurs in the Cimarron River in southern Kansas and northern Oklahoma. During surveys conducted across its range in 2005-2006, Arkansas darters were observed at 29 of 67 sites. During surveys conducted in the Cimarron River and its tributaries in Oklahoma in 2009 they were observed at 4 of 13 sites (USFWS 2010). The Project has not acquired locational data for these sites.

Most of the 12 populations are currently isolated by dams and other anthropogenic structures and therefore are disconnected from other suitable habitats by long reaches of main stem rivers or streams (i.e., unsuitable habitats) that limit or prevent dispersal (USFWS 2010). As a result, current populations of the Arkansas darter are declining (NatureServe 2013). Although populations have declined in areas where spring flows have decreased or been eliminated, they appear stable at most sites where spring flows persist (USFWS 2008).

5.14.3 Current Threats

Habitat loss through stream depletions primarily associated with groundwater pumping for agricultural irrigation is the primary threat to the Arkansas darter. Groundwater pumping may result in the drying of spring-fed streams and marshes, resulting in localized extirpations or relegating populations to less favorable habitats (USFWS 2008, 2010). In its 2010 species assessment, the USFWS stated that groundwater withdrawals have impacted stream flows in Oklahoma and have likely contributed to a contraction of the range of this species in this area (USFWS 2010). Surface water withdrawals, irrigation diversions, and an increase in irrigation are moderate threats to habitat (MDC 2000; USFWS 2008, 2010). Current surface water withdrawals for agricultural purposes are thought to contribute to seasonal low water (or even dry) conditions in segments of the Cimarron River and its tributaries in Oklahoma, limiting this species' ability to migrate to previously occupied habitats (USFWS 2010). An increase in the number of irrigated acres within southern Kansas and northwestern Oklahoma has likely contributed to a reduction in the Arkansas darter's range in these areas (USFWS 2010).

Introductions and spread of long-rooted, groundwater-dependent vegetation such as the invasive saltcedar (*Tamarix* sp.) into the Arkansas darter's habitat alter stream flow by withdrawing and transpiring large amounts of water and by trapping floodwater. Continued invasion of salt cedar may detrimentally affect herbaceous vegetation used by the Arkansas darter (USFWS 2010). Spill and runoff of waste product from confined-animal feeding operations can negatively impact the Arkansas darter by degrading water quality on a watershed scale (USFWS 2008, 2010). Urban and suburban development in the eastern portion of its range within the Neosho River basin is adversely affecting the Arkansas darter and its habitat, particularly in the Illinois River watershed in Arkansas (USFWS 2010). In addition, the construction of dams and reservoirs inhibits migration and fragments populations, and represents an additional threat (USFWS 2010).

5.14.4 Potential Presence in the Action Area

Definition of the Action Area

The Action Area for the Arkansas darter includes the intersection of the project disturbance footprint with any perennial or intermittent tributaries of the Cimarron River in Harper County, Oklahoma. In addition, the Action Area extends 100 feet upstream and 300 feet downstream of the crossings.

Presence in the Action Area Based on Existing Data

In the vicinity of the Project, the Arkansas darter is potentially present in the Cimarron River and associated perennial and intermittent tributaries in Beaver, Harper, and Woodward Counties, Oklahoma (see Figure 5.14-1, "Arkansas Darter Range in the Vicinity of the Project"; USFWS 2010, 2013). The Project route does not cross the Cimarron River in these counties; however, the route does cross nine intermittent tributaries of the Cimarron River in Harper County that have a low potential to support Arkansas darters (see Figure 5.14-2, "Potential Presence of the Arkansas Darter Range in the Action Area"). Based on a review of the National Hydrography Database, (USGS 2013), the route does not cross any tributaries of the Cimarron River in Beaver or Woodward Counties.

Additional Desktop/Field Analyses

Based on technical assistance letters to the Project (USFWS 2013, 2014b), this assessment assumes presence of Arkansas darters in the Action Area, defined as the perennial and intermittent tributaries of the Cimarron River in Harper County, Oklahoma. Based on this conservative assumption, no additional desktop analyses or field surveys are planned.

5.14.5 Direct and Indirect Impacts

Direct Mortality/Injury

Excavation, vehicle and equipment travel, or other Project activities in waterbodies that potentially support the Arkansas darter could result in injuries to or mortalities of individuals of this species, their larvae, or their eggs. To avoid these direct impacts, Clean Line will avoid excavation, placement of structure foundations, or other construction activities within the OHWM of perennial and intermittent waterbodies where this species is potentially present. However, Clean Line may need to construct new access roads in tributaries within the range of this species. Clean Line will coordinate with the USFWS and applicable state resource agencies to identify site-specific measures to avoid or minimize potential impacts associated with the construction of new access roads.

Arkansas darters occupy habitats with cool, clear spring-fed waters. Increased turbidity could result in decreases in dissolved oxygen and increases in water temperature, which could negatively affect Arkansas darters (USFWS 2010). Accidental spills of hazardous materials resulting from Project activities, including diesel fuel, gasoline, oil, and hydraulic fluids from construction or O&M equipment, into the Cimarron River or its tributaries could result in mortality or injury of individual Arkansas darter, their larvae, or their eggs if these come into direct contact with the contaminant. Even if hazardous materials do not immediately enter aquatic habitats, subsequent rain events or flooding could transport these materials from adjacent areas into occupied waterbodies. In addition, spills of herbicides, over-spraying of herbicides, or off-label use of herbicides (i.e., those not approved for use near aquatic habitats) anywhere in or adjacent to waterbodies during noxious weed control activities could similarly result in mortality or injury of Arkansas darters. Accidental spills of hazardous materials will be immediately contained and properly cleaned up with onsite spill response kits.

Short-term increases in sediment loads and turbidity in aquatic habitats resulting from grading, excavating, vehicle travel, and other construction-related ground disturbances, could also result in mortality of or injury to Arkansas darters, their eggs, or their larvae. The Project will implement EPMs and species-specific measures designed to avoid or reduce the potential for impacts on habitat from hazardous materials spills and increased sedimentation, including application of refueling and maintenance buffers (GE-14); herbicide use standards (GE-5); and use of proper erosion control devices (GEO-1). In addition, the Project will develop and implement a SWPPP to control sedimentation, erosion, and runoff from disturbed areas (see Section 2.5, "Environmental Protection Measures") which will also avoid and minimize these impacts on Arkansas darters. Any remaining impacts on Arkansas darters from increased sedimentation and turbidity would likely be minor and short-term.

Construction-related groundwater or surface water withdrawals in or near streams where Arkansas darters are present could negatively affect this species by reducing water levels to below that necessary for migration, spawning, or everyday survival. To avoid contributing to such impacts, Clean Line will obtain all water needed for construction purposes, e.g., dust control, from other sources (W-15).

Sensory Disturbance

Project-related activities are not likely to result in impacts on Arkansas darters through sensory disturbances. Permanent towers and temporary work areas would all be sited outside of the banks of waterways occupied by this species, and the activities associated with construction of transmission lines of this size would typically not cause noise impacts, excessive ground vibrations, or visible disturbance near the water. Some noise and vibration impacts could result from excavation of the tower footings adjacent to waterways, depending on substrates, but these impacts would be minimal and short-term. In general, any sensory impacts would occur at the time of the construction disturbances, and any effects on Arkansas darters should be minimal and dissipate soon thereafter. However, Clean Line will minimize the potential for these impacts through the protection measures described below (see Section 5.14.6, "Protection Measures").

Habitat Loss/Alteration

Excavation, vehicle and equipment travel, temporary or permanent bridge installation, or other construction activities in waterbodies that potentially support the Arkansas darter could potentially result in loss or degradation of Arkansas darter habitat. Loss of in-stream vegetation in particular could negatively affect this species' ability to hunt for prey and evade predators. To avoid or minimize impacts on habitat, Clean Line will prohibit construction disturbances within the OHWM of waterways that support this species. Habitat loss or alteration impacts are not likely to occur as a result of Project-related construction activities, after implementation of all EPMs and species-specific measures, or as determined through additional coordination with USFWS and applicable state resource agencies.

Hazardous material spills, including releases of diesel fuel, gasoline, oil, hydraulic fluid, or herbicides, could adversely affect habitat, water and soil conditions and the health of aquatic plants and adjacent riparian vegetation, at the Project crossing or at downstream locations. Over-spraying of herbicides or off-label use of herbicides (i.e., those not approved for use near aquatic habitats) anywhere in or adjacent to waterbodies during noxious weed control activities could result in short-term degradation of aquatic habitats by damaging or removing native plant species in the water or on river banks. The Project will implement EPMs and species-specific measures designed to avoid or reduce the potential for impacts on habitat from hazardous materials spills and increased sedimentation, including application of refueling and maintenance buffers (see Section 5.14.6.1, "Environmental Protection Measures").

Loss of riparian trees and other vegetation on the banks of streams could affect habitat quality by increasing sediment loads through erosion and increased turbidity or by the cutting and sloughing of banks and causing channelization of streams. Acute increases in levels of siltation in the water column or on substrates could render waters unsuitable for egg hatching or larva development. Alteration of physical conditions of streambeds and banks during construction could result in adverse changes in stream characteristics favored by Arkansas darters (i.e., shallow, clear, spring-fed tributaries with cool water, sand or sandy-gravel substrates, and presence of rooted aquatic vegetation). Loss of in-stream rooted aquatic vegetation that provides cover from predators could result in increased predation of Arkansas darters. When possible, Clean Line will limit the removal of low-growing vegetation within 100 feet of the OHWM (i.e., the river buffer zone), except where necessary for access, to help avoid or minimize potential impacts on Arkansas darter habitat (see Section 5.14.6.2, "Species-specific Measures").

Accidental spills of hazardous materials, or increased sedimentation and turbidity would largely dissipate within a short distance downstream of the Project crossing site (assumed to be 100 feet upstream and 300 feet downstream for the purposes of this analysis). The Project would implement a number of EPMs and species-specific measures designed to avoid or reduce the potential for these impacts, including refueling and maintenance buffers (GE-14); herbicide use standards (GE-5); and use of proper erosion control devices (GEO-1).

5.14.6 Protection Measures

Clean Line will use a number of measures to avoid and minimize impacts on Arkansas darters. These measures include many of the Clean Line-designated EPMs outlined in Section 2.5, "Environmental Protection Measures," and additional species-specific measures. Collectively, the EPMs and species-specific measures are referred to as "protection measures."

5.14.6.1 Environmental Protection Measures

The following EPMs—general (GE); soils (GEO); fish, vegetation, and wildlife (FVW); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on Arkansas darters.

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety, and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-4) – Vegetation removed during clearing will be disposed of according to federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to pre-construction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-9) – Clean Line will avoid and/or minimize damage to drainage features and other improvements such as ditches, culverts, levees, tiles, and terraces; however, if these features or improvements are inadvertently damaged, they will be repaired and or restored.
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies, and groundwater wells, or as otherwise required by federal, state, or local regulations.

- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.
- (GE-20) – Clean Line will conduct construction and scheduled maintenance activities on the facilities during daylight hours, except in rare circumstances that may include, for example, to address emergency or unsafe situations, to avoid adverse environmental effects, to minimize traffic disruptions, or to comply with regulatory or permit requirements.
- (GE-21) – Clean Line will maintain construction equipment in good working order. Equipment and vehicles that show excessive emissions of exhaust gasses and particulates due to poor engine adjustments or other inefficient operating conditions will be repaired or adjusted.
- (GE-27) – Clean Line will minimize compaction of soils and rutting through appropriate use of construction equipment (e.g., low ground pressure equipment and temporary equipment mats).
- (GE-28) – Hazardous materials and chemicals will be transported, stored, and disposed of according to federal, state, or local regulations or permit requirements.

Soils EPM:

- (GEO-1) – Clean Line will stabilize slopes exposed by its activities to minimize erosion.

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-2) – Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.

Waters, Wetlands, and Floodplains Measures:

- (W-1) – Clean Line will avoid and/or minimize construction of access roads in special interest waters.
- (W-2) – Clean Line will identify, avoid, and/or minimize adverse effects to wetlands and waterbodies. Clean Line will not place structure foundations within the OHWM of Waters of the United States.
- (W-3) – Clean Line will establish streamside management zones within 50 feet of both sides of intermittent and perennial streams and along margins of bodies of open water where removal of low-lying vegetation is minimized.
- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.

- (W-5) – Clean Line will construct access roads to minimize disruption of natural drainage patterns including perennial, intermittent, and ephemeral streams.
- (W-6) – Clean Line will not construct counterpoise or fiber optic cable trenches across waterbodies.
- (W-7) – Clean Line will locate spoil piles from foundation excavations and fiber optic cable trenches outside of streamside management zones.
- (W-8) – Dewatering will be conducted in a manner designed to prevent soil erosion (e.g., through discharge of water to vegetated areas and/or the use of flow control devices).
- (W-15) – Clean Line will seek to procure water from municipal water systems where such water supplies are within a reasonable haul distance; any other water required will be obtained through permitted sources or through supply agreements with landowners.

5.14.6.2 Species-specific Measures

In addition to the EPMs described above, the Project will implement the following species-specific measures that will further contribute to avoiding and/or minimizing impacts on Arkansas darters.

- Clean Line will not excavate or disturb substrates within the OHWM of perennial or intermittent waterbodies, and springs or spring runs that have important aquatic vegetation where the Arkansas darter is present.
- Clean Line will attempt to avoid constructing new access roads in tributaries within the range of this species; however, if this becomes necessary, Clean Line will coordinate with the USFWS and applicable state resource agencies to identify site-specific measures to avoid or minimize these impacts.
- When possible, Clean Line will not remove low-growing vegetation within 100 feet of the OHWM (i.e., the river buffer zone), except where necessary for access, along all perennial and intermittent waterbodies where the Arkansas darter is present (USFWS 2014b). Within the river buffer zone, Clean Line will implement vegetation clearing methods that avoid or minimize soil disturbance.
- If waterbodies with potential presence of the Arkansas darter require in-stream disturbance activities, including excavation or other project activities, then Clean Line will coordinate with the USFWS and applicable state resource agencies to identify additional site-specific measures to avoid or minimize impacts to the extent possible.

5.14.7 Effects Determination

The Arkansas darter has only a very small potential to be present in nine intermittent tributaries of the Cimarron River crossed by the Project in Harper County, Oklahoma. The Project will attempt to avoid impacts on Arkansas darters altogether by siting all permanent and temporary Project facilities outside of the OHWM of these waterbodies. Clean Line will prohibit excavation or other soil disturbance activities within the OHWM of perennial and intermittent waterbodies where this species is potentially present. When possible, Clean Line will not remove low-growing vegetation within 100 feet of the OHWM (i.e., the river buffer zone), except where necessary for access along these streams, to help avoid or minimize potential erosion and sedimentation impacts on Arkansas darter habitat. Clean Line will implement vegetation clearing methods within the river buffer zone that will avoid or minimize soil disturbance. In the unlikely instance that it is determined that construction-related disturbance within the OHWM in one or more of these waterbodies is necessary, Clean Line will coordinate with the

USFWS and applicable state resource agencies to identify site-specific measures to avoid or minimize impacts to the extent possible. Taking into consideration the proposed Project design as well as the implementation of the aforementioned EPMs and species-specific measures proposed by Clean Line, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project “may affect, but is not likely to adversely affect” the Arkansas darter.

The Arkansas darter does not currently have designated critical habitat; therefore, the Project “will not destroy or adversely modify” critical habitat for the species.

5.15 Arkansas River Shiner

The Arkansas River shiner (ARS; *Notropis girardi*) was listed as threatened under the Endangered Species Act on November 23, 1998 (USFWS 1998). The USFWS released a final decision on critical habitat designation in April 2001, but due to legal challenges, a final rule was not completed until October 3, 2005 (USFWS 2007). The final critical habitat included 532 river miles in portions of the Cimarron and Canadian Rivers in the Arkansas River Basin of Oklahoma and southern Kansas. Critical habitat includes the stream channels and a lateral distance of 300 feet on each side of the stream width at bankfull discharge (USFWS 2005). The designated critical habitat includes a segment of the Cimarron River in Oklahoma and Kansas and the Canadian River in Oklahoma. Critical habitat boundaries are as follows: for the Cimarron River approximately 286 miles, extending from the U.S. Highway 54 bridge in Seward County, Kansas, downstream to the U.S. Highway 77 bridge in Logan County, Oklahoma; for the Canadian River, approximately 246 miles, extending from the State Highway 33 bridge near Thomas, Oklahoma, downstream to Indian Nation Turnpike bridge northwest of McAlester, Oklahoma.

5.15.1 Natural History

Range

The ARS is a small minnow species that historically was widely distributed in western portions of the Arkansas River Basin in New Mexico, Texas, Kansas, Oklahoma, and Arkansas (USFWS 2011, 2013). The species is no longer thought to be present in Arkansas (Pigg, Gibbs, and Cunningham 1999; USFWS 1998, 2007). It is presently thought to be restricted to approximately 508 rmi of the Canadian River in New Mexico, Texas, and Oklahoma, with remnant populations possibly persisting in the Cimarron River in Oklahoma (see Figure 5.15-1, “Arkansas River Shiner Range in the Vicinity of the Project”) (USFWS 1998, 2007). Historically, populations of ARS were present in the North Canadian/Beaver River system in Oklahoma, and this species was reported to be present but very rare as of 1997 (Pigg, Coleman, and Gibbs 1997; Pigg, Gibbs, and Cunningham 1999); however, this species is no longer considered to be present in this river system (USFWS 2005, 2010, 2014a).

Habitat

ARS generally occupy the main channels of wide, shallow rivers or streams with sandy substrates (Pigg, Gibbs, and Cunningham 1999; USFWS 2011). Adults are often found immediately downstream of sandy ridges where they feed. Adult ARSs are uncommon in deep waters, pools, quiet backwaters, or in waters with mud or stone substrates. However, juveniles seek out the protection of nursery sites in backwaters and island habitats, or slower moving waters where food is available (USFWS 1998; CRMWA 2005). This species is adapted to rivers of the southern Great Plains that exhibit high wet-dry season flow fluctuations and experience extremes in water conditions, including discharge, current velocity, turbidity, dissolved oxygen concentration, and pH (Pigg, Gibbs, and Cunningham 1999). Physical and chemical conditions can vary greatly in these streams, and events such as drought and flood are relatively common (Durham and Wilde 2005). The ARS is generally considered to be a large-river species that requires high water flow volumes and current velocities to complete its reproductive cycle and thrive (USFWS 1998; Bonner and Wilde 2000).

Feeding

The ARS is considered to be a generalized forager, feeding on detritus, grass seeds and other plant materials, terrestrial and aquatic invertebrates washing downstream, and even sand-silt (up to 40% of diet; USFWS 2011). The presence of terrestrial invertebrates in the diet of the ARS suggests they feed on drifting insects while the presence of sand-silt suggests they also forage in sediments on the river bottom (Wilde, Bonner, and Zwank 2001).

Breeding

ARS breeding season occurs during summer months, and generally coincides with high water levels after heavy rains (CRMWA 2005). Multiple spawning events generally occur between May and July, but can extend into August or early September, depending on seasonal environmental conditions (USFWS 2011; Mueller 2013). The ARS is a broadcast spawner (or pelagic spawner), with multiple releases of eggs and sperm into the open water over the breeding season. This strategy of spreading reproductive output over an extended period increases the chances that at least some offspring will survive in river systems that exhibit sharp variability in seasonal conditions. Spawning produces non-adhesive, semi-buoyant eggs that float on or just below the water surface and drift freely with the currents. Eggs hatch within one to two days of fertilization, and larvae typically float for several days until developed enough to swim out of the main current and into slower moving waters and nursery sites. In the absence of suitable current velocity, eggs may sink to the stream bottom and become crushed by shifting rocks or buried by silt, which prevents respiration (Mueller 2013).

Environmental factors such as increases in water temperature positively affect egg buoyancy, allowing for a lower minimum current velocity to keep eggs adrift. Mueller (2013) estimated that the minimum required river distance for eggs to hatch and larvae to develop sufficiently was 62.5 miles, but Bonner and Wilde (2000) deduced this minimum length could be as much as 135 miles. By either estimate, this species requires substantial lengths of relatively unobstructed perennial river habitat with suitable conditions (e.g., high current velocity) to complete the reproductive cycle (Perkins and Gido 2011). The ARS may delay spawning, or forgo spawning altogether, if conditions for egg and hatchling survival are not favorable (CRMWA 2005). Most ARS are short-lived, with up to 90% of the population not surviving from one year to the next (USFWS 2011).

5.15.2 Population Status

The ARS was considered widespread and abundant throughout its historical range. Populations of ARS have been extirpated from 80% to 90% of this historical range, and much of this decline has occurred over the past 35 years. The historical and current range-wide population sizes of the ARS are unknown, but the distribution and abundance within its historic range is considered to be greatly reduced (USFWS 2007, 2013).

ARS populations are considered to be stable in many segments of the Canadian River in New Mexico, Texas, and Oklahoma, although some segments have experienced steep localized declines. Surveys conducted in a segment of the Canadian River in Texas above Lake Meredith found that ARS made up more than 25% of the fish species assemblage from 1954 to 1955, and 18% of the assemblage from 1995 to 1996 (Bonner and Wilde 2000). Over the same period during surveys conducted in a segment of the Canadian River in Texas below Lake Meredith—which is the last large dam and reservoir before flowing east into Oklahoma—abundance of ARS relative to other fish species decreased from more than 21% to 0.2% (Bonner and Wilde 2000). During another study conducted annually from 1977 to 1997 at three sites on the Canadian River in Oklahoma, more than 61,426 individual ARS were collected (13% of all collections [Pigg, Gibbs, and Cunningham 1999]). Annual data varied, but a general annual decrease in both the total number of ARS collected and the abundance of this species relative to the total number of other fish collected were observed. An extremely small population may still be present in the Cimarron River system in Oklahoma and Kansas, based on the collection of 16 individuals between 1985 and 1992 (USFWS 2007, 2010). The USFWS (2005) has stated that the occupied segments of the Canadian and Cimarron Rivers represent the largest, and possibly only, remaining viable populations of the ARS. The ARS is thought to have disappeared from the North Canadian River altogether, although this river has been identified as having the greatest potential for reintroducing the species within an area of historical range (Pigg, Coleman, and Gibbs 1997; USFWS 2005). In observations made in this river in

1994, only one specimen was found, and more recent studies have failed to find any at all (Pigg, Coleman, and Gibbs 1997).

5.15.3 Current Threats

The primary threats to ARS are habitat modification and fragmentation resulting from stream channelization, construction of reservoirs and other impoundments, stream flow alteration and depletion, and, to a lesser extent, water quality degradation (Bonner and Wilde 2000; CRMWA 2005). Fragmentation or modification of habitat due to the construction of dams and reservoirs may result in river segments that do not have sufficient length, current velocity, volume, temperature (e.g., due to cold tail-waters below dams), and other environmental conditions the species requires to complete its lifecycle (USFWS 2009; Perkins and Gido 2011; Mueller 2013). The construction of reservoirs throughout the Arkansas River system, including on the Canadian River in New Mexico (Ute Reservoir) and Texas (Lake Meredith), has contributed greatly to reductions in flow volume.

Bonner and Wilde (2000) reported that a section of the Canadian River near the Texas border in Oklahoma contained only 24% of its historic volume. This decrease in flow volume has, in many locations, altered the river from a wide, braided stream to a narrow, channelized stream. In addition, groundwater and surface water withdrawals (e.g., for irrigation purposes) have reduced stream flows in parts of the ARS historic range, including western Oklahoma, and continued withdrawals will likely further diminish stream flows and degrade ARS habitat (USFWS 1998). Reductions in flow volume and changes in river morphology have contributed to increased competition with ARS and other large-river fish species by species that previously inhabited only smaller tributaries. Although ARS is adapted to rivers that exhibit high seasonal flow fluctuations and extremes in environmental conditions, degradation of water quality through increased sedimentation (e.g., from overgrazing by cattle) or industrial and agricultural contamination (e.g., waste from corporate swine farms) is an ongoing threat (USFWS 1998).

Other threats include the introduction of non-native plants and wildlife, predation by game fish, disturbance from recreational vehicles, and catastrophic events. Introductions and spread of long-rooted, groundwater-dependent vegetation, such as the invasive saltcedar (*Tamarix* sp.), along the Canadian River and its tributaries have altered stream flow by withdrawing and transpiring large amounts of water and by trapping floodwater (CRMWA 2005; USFWS 1998). In addition, the presence of saltcedar and other invasive species along riverbanks has tended to confine water to channels at some locations and remove the braided channels favored by the ARS. Competition with (and possible predation of larvae by) the introduced Red River shiner (*Notropis bairdi*) may contribute to the reduced Cimarron River ARS population size (Pigg, Gibbs, and Cunningham 1999; CRMWA 2005). The Red River shiner is endemic to the Red River in northern Texas, southern Oklahoma, and far southwest Arkansas, and competes with the ARS for food and other essential life requirements (USFWS 2005; Hendrickson and Cohen 2012).

Predation by larger fish, such as the introduced largemouth bass (*Micropterus salmoides*), the native green sunfish (*Lepomis cyanellus*), and the native channel catfish (*Icalarus punctatus*), likely occurs, but the overall impact on ARS populations due to predation by these species is considered to be localized and insignificant (USFWS 1998). Predation from the introduced mosquito fish (*Gambusia affinis*) may be more problematic; Pigg, Gibbs, and Cunningham (1999) suggested that predation by this species on eggs and fry could have a substantial impact on the ARS. Off-road vehicles travelling in and near rivers can injure or destroy floating eggs and larvae and disturb habitat. In general, the breeding strategy and the limited range of the ARS makes this species highly susceptible to catastrophic events, such as a large contaminant spill or a prolonged drought. Decreases in flow volume and current velocity associated with drought could result in failed or reduced reproductive success throughout all or portions of occupied systems. Catastrophic events such as these would add significant stress to populations, which already have reduced and limited ranges, and increase the likelihood of extinction (NatureServe 2013).

5.15.4 Potential Presence in the Action Area

Definition of Action Area

The Action Area for ARS includes the intersection of the project disturbance footprint with the Cimarron River and associated perennial and intermittent tributaries in Harper, Woodward, Major, and Garfield Counties, Oklahoma. The Action Area extends 100 feet upstream and 300 feet downstream of the crossings. In addition, at the designated critical habitat at the Cimarron River crossing in Major County, the Action Area extends 300 feet (laterally) from each side of the stream width at bankfull discharge. The USFWS includes upland areas within 300 feet of either stream bank in its definition of critical habitat for the ARS. This same standard was applied to the Action Area at the Cimarron River for assessing impacts on ARS due to Project–related disturbances in adjacent upland areas.

Presence in the Action Area Based on Existing Data

The ARS is potentially present in the Cimarron River in the vicinity of the Project (only west of U.S. Highway 77 in Logan County, Oklahoma[USFWS 2013]). The Proposed Route crosses the Cimarron River and designated critical habitat once at a location where the ARS may be present, in southeast Major County. The Project does cross the Cimarron River a second time farther downstream, in Payne County (southeast of Stillwater, Oklahoma); however, this location is not within the river segment where the USFWS reports this species is present (USFWS 2010, 2013). In their April 10, 2013 letter to the DOE regarding the Project, the USFWS stated that ground disturbance in associated tributaries could result in impacts on this species. Therefore, to take a conservative approach and ensure impacts on this species are avoided or minimized, this analysis assumes ARS to be potentially present at all crossings of perennial and wetted intermittent tributaries of the Cimarron River upstream of U.S. Highway 77 in Logan County, Oklahoma. Based on this assumption, the Project will cross approximately 75-85 perennial or intermittent tributaries of the Cimarron River that potentially support ARS in Harper, Woodward, Major, and Garfield Counties, Oklahoma.

Potential populations of ARS in the Cimarron system are described as “small” or “remnant” by various sources, and it is not certain that this system presently supports ARS (USFWS 1998, 2007; CRMWA 2005). The potential for presence of ARS in the Cimarron River system is based on records of fewer than 20 individuals between the years of 1985 and1992 (USFWS 2007). Therefore, the likelihood of presence of ARS at Project crossings along the Cimarron River and its tributaries is considered low.

Data obtained from the Oklahoma Natural Heritage Inventory (2013) and the Oklahoma Biological Survey (2011) database contained records of ARS in other locations in the Cimarron River system, as well as in the North Canadian/Beaver River drainage; however, the dates of the records were not provided. These data sources conflict with current information provided by the USFWS and other sources and may be outdated, as ARS is thought to have disappeared from these river segments in recent decades (Pigg, Coleman, and Gibbs 1997; Pigg, Gibbs, and Cunningham 1999; USFWS 2007, 2010). The most recent record of ARS in the North Canadian River (a single specimen from the far western side of the river system) dates from 1994. Current information indicates that the ARS is no longer considered to be present in this system (Pigg, Coleman, and Gibbs 1997; USFWS 2005, 2010). Therefore, the North Canadian/Beaver River or its tributaries are not included in the Action Area.

Additional Desktop/Field Analyses

Based on a technical assistance letter regarding the Project (USFWS 2013), the Project will assume the presence of ARS in the Action Area, defined as the Cimarron River crossing in Major County, Oklahoma, and any associated perennial and intermittent tributaries that are located west of U.S. Highway 77 in Logan County, Oklahoma. No additional desktop analyses or field surveys are required to inform the analysis regarding potential impacts on this species.

5.15.5 Direct and Indirect Impacts

Direct Mortality/Injury

Excavation, vehicle and equipment travel, or other Project activities in designated critical habitat and other waterbodies that potentially support the ARS could result in injuries to or mortalities of individuals of this species, their larvae, or their eggs. To avoid these direct impacts, Clean Line will limit soil disturbance in designated critical habitat for this species at the Cimarron River crossing in Major County, Oklahoma. In addition, Clean Line will avoid excavation, placement of structure foundations, or other construction activities within the OHWM of all other perennial and intermittent tributaries of the Cimarron River where this species is potentially present. However, Clean Line may need to construct new access roads in tributaries within the range of this species. Clean Line will coordinate with the USFWS and applicable state resources agencies to identify site-specific measures to avoid or minimize impacts associated with the construction or use of new access road crossings.

Accidental spills of hazardous materials resulting from Project activities, including diesel fuel, gasoline, oil, or hydraulic fluids, into the Cimarron River or its tributaries could result in mortality or injury of ARS, their larvae, or their eggs if these come in direct contact with the contaminant. Even if hazardous materials do not immediately enter aquatic habitats, subsequent rain events or flooding could transport these materials from adjacent areas into occupied waterbodies. In addition, spills of herbicides, over-spraying of herbicides, or off-label use of herbicides (i.e., those not approved for use near aquatic habitats) anywhere in or adjacent to waterbodies during noxious weed control activities could similarly result in mortality or injury of ARS. Although only limited soil disturbance activities will occur in the critical habitat at the Cimarron River crossing (which includes areas within 300 feet of either bank)), heavy rainfall subsequent to spills in adjacent areas could result in transport of these substances into occupied habitat at this location as well. If accidental spills of hazardous materials were to occur, they would be immediately contained and properly cleaned up with on-site spill response kits.

Short-term increases in sediment loads and turbidity in aquatic habitats resulting from grading, excavating, and other construction-related ground disturbances, could result in injury or adverse effects to adult ARS, their eggs or larvae, but mortality is not likely. ARSs are adapted to typical rivers of the southern Great Plains, which display high seasonal increases in sediment load and turbidity (Pigg, Gibbs, and Cunningham 1999). Impacts on ARS due to increased sedimentation and turbidity would likely be minor and short term when considering the species' ability to thrive in seasonally turbid environments. However, ARS are very rare in the Cimarron River, if they persist at all. Therefore, any loss of ARS in the Cimarron River could result in a substantial decrease in the range of the species and long-term adverse impacts on the health of the overall population.

The Project would implement a number of EPMs and species-specific measures designed to avoid or reduce the potential for impacts on habitat from hazardous materials spills and increased sedimentation, including refueling and maintenance buffers (GE-14), herbicide use standards (GE-5), and use of proper erosion control devices (GEO-1). In addition, the Project will develop and implement a SWPPP to control sedimentation, erosion, and runoff from disturbed areas (see Section 2.5, "Environmental Protection Measures") which will also avoid and minimize impacts on ARS.

Construction-related groundwater or surface water withdrawals in or near streams where ARS are present could negatively affect ARS by reducing water levels to below that necessary for migration, spawning, or everyday survival. To avoid contributing to such impacts, Clean Line will obtain all water needed for construction purposes, e.g., dust control, from other sources (W-15).

Sensory Disturbance

Project-related activities are not likely to result in impacts on the ARS through sensory disturbances. Permanent towers and temporary work areas would all be sited outside of the banks of waterways occupied by this species, and the activities associated with construction of transmission lines of this size would typically not cause loud noises, or excessive ground vibrations or visible activity near the water. Some noise and vibration could result from excavation of the tower footings adjacent to waterbodies, depending on substrate types, but these impacts would be very small and short term. In general, any sensory impacts would occur at the time of the construction disturbances, and any effects on ARS should be minimal and would dissipate soon thereafter. However, Clean Line will minimize the potential for these impacts through the protection measures described below (see Section 5.15.6, "Protection Measures").

Habitat Loss/Alteration

Excavation, vehicle and equipment travel, temporary or permanent bridge installation, or other construction activities in designated critical habitat or other waterbodies that potentially support ARS could result in loss or degradation of ARS habitat. To avoid these impacts, Clean Line will limit soil disturbance resulting from the use of mechanized equipment (e.g., graders, excavators) or vehicles in designated critical habitat for this species at the Cimarron River crossing in Logan County, Oklahoma. Note that some soil disturbances may be required in critical habitat and other riparian areas; however, this disturbance is expected to be minimal. Crews may need to hand clear trees and shrubs from the designated critical habitat area and use a tractor (or similar) to remove this vegetation to an upland area beyond the critical habitat for disposal. In addition, Clean Line will prohibit excavation, placement of structure foundations, construction of permanent access roads, or other construction activities within the OHWM of other perennial and intermittent waterbodies where this species is present, except for in site-specific situations. Loss or alteration of designated critical habitat or other occupied habitats are not likely to occur as a result of Project-related construction activities, after implementation of all EPMs and species-specific measures, or as determined through additional consultations with USFWS and applicable state resource agencies.

Hazardous material spills, including releases of diesel fuel, gasoline, oil, hydraulic fluid, or herbicides, could adversely affect water and soil conditions and the health of aquatic plants and adjacent riparian vegetation at the Project crossing or at downstream locations. Over-spraying of herbicides or off-label use of herbicides (i.e., those not approved for use near aquatic habitats) anywhere in or adjacent to waterbodies during noxious weed control activities could result in short-term degradation of aquatic habitats by damaging or removing native plant species in the water or on river banks. The Project will implement EPMs and species-specific measures designed to avoid or reduce the potential for impacts on habitat from hazardous materials spills and increased sedimentation, including application of refueling and maintenance buffers (see Section 5.15.6.1, "Environmental Protection Measures").

Loss of riparian trees and other vegetation on the banks of streams could affect habitat quality by increasing sediment loads through erosion and increased turbidity or by the cutting and sloughing of banks and causing channelization of streams. Acute increases in levels of siltation or sedimentation could render waters unsuitable for egg hatching or larva development. However, because ARS evolved in environments with high seasonal and annual fluctuation in turbidity levels, most potential increases in sedimentation and turbidity due to construction would be minor and short term. Alteration of physical conditions of streambeds and banks during construction could result in adverse changes in stream characteristics favored by ARS (e.g., shallow waters with sandy substrates for adults, backwaters and island habitats for juveniles). Altered topography near streams could affect natural water conditions through increased or decreased runoff, resulting in unfavorable water conditions (USFWS 2013). When possible, Clean Line will not remove low-growing vegetation within 100 feet of the OHWM (i.e., the river buffer zone), except where necessary for access, to help avoid or minimize potential impacts on ARS habitat (Species-specific Measure).

Due to the high water flow velocities in the Cimarron River and its tributaries, most construction-related spills of hazardous materials or increased sedimentation and turbidity would largely dissipate within a short distance downstream of the Project crossing site (assumed to be 100 feet upstream and 300 feet downstream for the purposes of this analysis). Therefore, any remaining impacts on habitat are likely to be negligible to minimal and short term. The Project would implement a number of EPMs and species-specific measures designed to avoid or reduce the potential for these impacts, including refueling and maintenance buffers (GE-14); when possible, Clean Line will not remove vegetation or low-lying shrubs within 100 feet of the OHWM (i.e., the river buffer zone), except where necessary for access (species-specific measure); herbicide use standards (GE-5); and use of proper erosion-control devices (GEO-1).

5.15.6 Protection Measures

Clean Line will use a number of measures to avoid or minimize impacts on the ARS. These measures include many of the Clean Line-designated EPMs outlined in Section 2.5, "Environmental Protection Measures," and additional species-specific measures. Collectively, the EPMs and species-specific measures are referred to as "protection measures."

5.15.6.1 Environmental Protection Measures

The following EPMs—general (GE); fish, vegetation, and wildlife (FVW); soils and agriculture (AG); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on ARS:

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety, and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits.
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-4) – Vegetation removed during clearing will be disposed of according to federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-9) – Clean Line will avoid and/or minimize damage to drainage features and other improvements such as ditches, culverts, levees, tiles, and terraces; however, if these features or improvements are inadvertently damaged, they will be repaired and or restored.
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.

- (GE-14) – Clean Line will restrict refueling and maintaining vehicles and storing fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies, and groundwater wells, or as otherwise required by federal, state, or local regulations.
- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.
- (GE-20) – Clean Line will conduct construction and scheduled maintenance activities on the facilities during daylight hours, except in rare circumstances that may include, for example, to address emergency or unsafe situations, to avoid adverse environmental effects, to minimize traffic disruptions, or to comply with regulatory or permit requirements.
- (GE-21) – Clean Line will maintain construction equipment in good working order. Equipment and vehicles that show excessive emissions of exhaust gasses and particulates due to poor engine adjustments or other inefficient operating conditions will be repaired or adjusted.
- (GE-27) – Clean Line will minimize compaction of soils and rutting through appropriate use of construction equipment (e.g., low ground pressure equipment and temporary equipment mats).
- (GE-28) – Hazardous materials and chemicals will be transported, stored, and disposed of according to federal, state, or local regulations or permit requirements.

Soils EPM:

- (GEO-1) – Clean Line will stabilize slopes exposed by its activities to minimize erosion.

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-2) – Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility for construction crews.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.

Waters, Wetlands, and Floodplains Measures:

- (W-1) – Clean Line will avoid and/or minimize construction of access roads in special interest waters.
- (W-2) – Clean Line will identify, avoid, and/or minimize adverse effects to wetlands and waterbodies. Clean Line will not place structure foundations within the OHWM of Waters of the United States.

- (W-3) – Clean Line will establish streamside management zones within 50 feet of both sides of intermittent and perennial streams and along margins of bodies of open water where removal of low-lying vegetation is minimized.
- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.
- (W-5) – Clean Line will construct access roads to minimize disruption of natural drainage patterns including perennial, intermittent, and ephemeral streams.
- (W-6) – Clean Line will not construct counterpoise or fiber optic cable trenches across waterbodies.
- (W-7) – Clean Line will locate spoil piles from foundation excavations and fiber optic cable trenches outside of streamside management zones.
- (W-8) – Dewatering will be conducted in a manner designed to prevent soil erosion (e.g., through discharge of water to vegetated areas and/or the use of flow control devices).
- (W-15) – Clean Line will seek to procure water from municipal water systems where such water supplies are within a reasonable haul distance; any other water required will be obtained through permitted sources or through supply agreements with landowners.

5.15.6.2 Species-specific Measures

In addition to the EPMs described above, the Project will implement the following species-specific measures that will further contribute to avoiding and/or minimizing impacts on ARS:

- Clean Line will limit construction-related activities that could result in soil disturbance, such as use of mechanized construction equipment, in designated ARS critical habitat; for the Project this includes the Cimarron River crossing in Major County, Oklahoma, which includes upland areas within 300 feet of each side of the river width at bankfull discharge. Note that some soil disturbances may be required in critical habitat; however, crews will hand clear trees and shrubs and use a tractor (or similar equipment) to remove this vegetation to an upland area beyond the critical habitat.
- Clean Line will not excavate or disturb substrates within the OHWM of perennial or intermittent waterbodies where the ARS is present.
- Clean Line will attempt to avoid constructing new access roads in tributaries within the range of this species; however, if this becomes necessary, Clean Line will coordinate with the USFWS and applicable state resource agencies to identify site-specific measures to avoid or minimize these impacts.
- When possible, Clean Line will not remove low-growing vegetation within 100 feet of the OHWM (i.e., the river buffer zone), except where necessary for access, along all perennial and intermittent waterbodies where the ARS is potentially present (USFWS 2014b).
- If waterbodies with potential presence of ARS (with the exception of the Cimarron River crossing and associated designated critical habitat in Major County) require in-stream disturbance activities, including excavation, or other Project activities, then Clean Line will coordinate with the USFWS and applicable state resource agencies to identify additional site-specific measures to avoid or minimize impacts.

5.15.7 Effects Determination

The likelihood that the ARS is present at Project crossings in the Cimarron River or its tributaries is low. Clean Line expects to avoid impacts on the ARS by siting all permanent and temporary Project facilities outside of ARS critical habitat at the Cimarron River, and by avoiding or limiting disturbances within the OHWM of perennial and intermittent tributaries where ARS may be present. Clean Line will limit soil disturbance in designated critical habitat for this species at the Cimarron River crossing in Logan County, Oklahoma. Crews will hand clear trees and shrubs and use a tractor (or similar) to remove this vegetation to an upland area beyond the critical habitat. Clean Line will prohibit excavation or other soil disturbance activities, within the OHWM of other perennial and intermittent waterbodies where this species is present. When possible, Clean Line will not remove low-growing vegetation within 100 feet of the OHWM (i.e., the river buffer zone), except where necessary for access. Potential impacts on root structure are expected to be minimal and in many areas avoided altogether, and functionality of the habitat for ARS should not be affected. In the unlikely instance that it is determined that construction-related disturbance or new access roads within the OHWM in one or more of these waterbodies is necessary, Clean Line will coordinate with the USFWS and applicable state resource agencies to identify site-specific measures to avoid or minimize impacts to the extent possible.

Taking into consideration the proposed Project design as well as the implementation of the aforementioned EPMs and species-specific measures proposed by Clean Line, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project “may effect, but is not likely to adversely affect” the ARS.

Similarly, while the Project may not completely avoid all potential impacts on designated critical habitat for the Arkansas River shiner, any unavoidable impacts are expected to be insignificant and discountable with the proposed Project design and the implementation of the aforementioned EPMs and species-specific measures. Therefore, the Project “may affect, but is not likely to adversely affect” designated critical habitat for the ARS.

5.16 Ozark Cavefish

In the USFWS April 2, 2014 clarification response letter to the DOE regarding the Project, the USFWS identified the Ozark cavefish (*Amblyopsis rosea*) as one of the federally listed species that occurs within the Arkansas portion of the Project, specifically in Crawford and Franklin counties (USFWS 2014). However, Clean Line has found no evidence for current or historical presence of this species in these counties. The Ozark cavefish was historically present in karst formations throughout the Springfield Plateau geologic province of the Ozark ecoregion, which spans more than 8,000 miles in northwestern Arkansas, southwestern Missouri, and northeastern Oklahoma (Graening et al. 2009; USFWS 2011). This species is now thought to occupy 41 sites or fewer across eight counties within this range, with sites in Benton County, Arkansas, and Delaware County, Oklahoma, being nearest to the proposed route. Neither Crawford nor Franklin County is located in the Springfield Plateau geologic province or aquifer.

The Action Area does not overlap with the current range of the Ozark cavefish, nor is it located upstream of occupied habitat; therefore, the proposed Project will have “no effect” on this species. As such, the Ozark cavefish is not discussed in more detail in this document.

5.17 Pallid Sturgeon

The pallid sturgeon (*Scaphirhynchus albus*) was listed as endangered under the ESA on September 6, 1990 (USFWS 1990). A Recovery Plan for the pallid sturgeon was first approved in November 1993, and a Draft Revised Recovery Plan was released in January 2013 (USFWS 2013a). No critical habitat has been designated for the pallid sturgeon.

5.17.1 Natural History

Range

The historical range of the pallid sturgeon included more than 3,500 rmi in the Yellowstone and Missouri Rivers in Montana south to the confluence with the Mississippi River, and in the Mississippi River from as far north as Keokuk, Iowa, south to the Gulf of Mexico (see Figure 5.17-1, "Pallid Sturgeon Range") (USFWS 1998, 2013a). Pallid sturgeons were also historically documented in the lower reaches of many of the larger tributaries to these three rivers, including the St. Francis River in the vicinity of the Project in Poinsett and Cross Counties, Arkansas (see Figure 5.17-2, "Pallid Sturgeon Range in the Vicinity of the Project").

The pallid sturgeon has been extirpated from approximately 28% of its historical range due to dam impoundments and has declined in the remaining unimpounded areas due to channelization and altered water conditions (USFWS 2013a). The present distribution of pallid sturgeons includes fragmented segments of the historical range, stretching from northern Montana to the Gulf of Mexico. Due to the construction of dams on the Missouri and Yellowstone river systems, pallid sturgeons have disappeared from some large segments of previously occupied habitat in South Dakota, North Dakota, and Montana. Pallid sturgeons are sparsely but continuously present from Fort Randall Dam near the South Dakota-Nebraska border, south to New Orleans and the Gulf of Mexico. This species is no longer present in the upper Mississippi River from the confluence with the Missouri River north to Keokuk, Iowa. Although still considered rare in the middle and lower Mississippi River regions (i.e., from confluence with the Missouri River south to the Gulf of Mexico), records of pallid sturgeons have increased in these reaches since listing in 1990 with increased sampling efforts. In addition, recent records indicate this species has expanded into approximately 25 miles of the lower Arkansas River in Arkansas and 200 miles of the Atchafalaya River in Louisiana (USFWS 2012, 2013a). Within the Mississippi River system, this species is most abundant at the extremes of its range: in the Atchafalaya River and near New Orleans in the south, and near the mouth of the Missouri River in the north (Killgore et al. 2007).

Habitat

The pallid sturgeon is a bottom-oriented species that occupies large rivers with relatively turbid, free-flowing waters (USEPA 2007; USFWS 2013a). Its preferred habitats include the main channels, side channels, floodplains, backwaters, islands, and alluvial bars typical of the Mississippi and Missouri River systems. Habitat and substrate use appear to vary by season and by location within the species' range. In the upper portions of the range, adults tend to occupy areas with islands and sinuous channels, while sub-adults tend to prefer main channel habitats (Gerrity 2005). Pallid sturgeons in the middle Mississippi River system use sites downstream of islands that are associated with border channel habitats rather than main channel habitats. Pallid sturgeons occurring in the lower reaches of the species' range may prefer channel border areas or sites with steep sloping banks (Killgore et al. 2007). During winter and spring pallid sturgeons frequent a mixture of sand, gravel, and rocky substrates, while in the summer and fall they tend to select for sites with sandy substrates (USFWS 2013a).

Pallid sturgeons have been documented in waters of varying depths, flow velocities, and turbidity levels. Depths at capture sites range from less than two feet to over 65 feet, but most individuals are found at 75% to 80% of maximum channel depth or deeper (Jordan et al. 2006; USFWS 2013a, 2013b). Bottom water velocities at capture sites are typically below 5 feet per second, with average velocity ranging from 2 to 3 feet per second (USFWS 2013a). Pallid sturgeons have been collected from waters with turbidity readings ranging from 5 to 100 nephelometric turbidity units in highly altered habitats, to seasonal readings above 1,000 nephelometric turbidity units in comparatively natural areas in the Yellowstone River system. Because pallid sturgeons have poor eyesight, taste buds on barbels and lips, and electroreceptors on the undersides of the snout, it appears this species evolved under turbid low-visibility conditions (Gerrity 2005; USFWS 2013a). The seasonally high turbidity levels of the Mississippi and Missouri Rivers likely are important components of this species' evolution and may be important for life history traits such as predator evasion and foraging methods.

Much of the information pertaining to this species originates from observations made in highly altered environments; therefore, the habitat preferences discussed above may reflect the most suitable habitat still available rather than natural preferences (Spindler 2008; USFWS 2013a).

Feeding

Data on the diet and feeding habits of pallid sturgeons are limited, although they are thought to be suctorial feeders that opportunistically prey on benthic fish and aquatic insect species (USEPA 2007; USFWS 2013a). Hatchery-raised fry are thought to largely rely on zooplankton and invertebrate prey, including mayfly (*Ephemeroptera*) and midge (*Chironomidae*) larvae in particular. Juveniles and adults feed primarily on fish, with increased proportions of fish in the diet as adults increase in size (Duffy, Berry, and Keenlyne 1996). In a 2006 study conducted by Gerrity, Guy, and Gardner (2008) in the Missouri River, fish were shown to comprise up to 90% by weight for juvenile (6 to 7 years old) pallid sturgeons. Although this species will feed over various substrates, diet data indicate that it prefers harder substrates such as rock and gravel (EPA 2007).

Breeding

The pallid sturgeon is a long-lived species with females reaching sexual maturity at 15-20 years and males at approximately 5 to7 years (EPA 2007; USFWS 2013a). Spawning for both males and females may not occur every year. Females may spawn as rarely as once every ten years, although in some parts of their range spawning every 2 to 3 years is more typical (Duffy, Berry, and Keenlyne 1996; EPA 2007; USFWS 2013b). Spawning is thought to occur between March and July (or later in higher latitudes) over gravel, cobble, or other firm substrates at sites with moderately high water velocities. Eggs settle on the substrate and hatch within 5 to 7 days, after which larval fish drift downstream for up to 13 days (and more than120 miles) before settling at the channel bottom. Perhaps due to larval drift, females are associated with long migrations during or immediately prior to spawning (USFWS 2013a).

5.17.2 Population Status

Little is known of the historical abundance of this species although it was already considered scarce in 1905 when it was first recognized as a species, accounting for only 1 in 500 *Scaphirhynchus* sturgeon collected in the middle Mississippi River (USFWS 2013a, 2013b). The current range-wide population of the pallid sturgeon is unknown. Although the pallid sturgeon is one of the rarest species of fish in the Missouri and Mississippi Rivers, the status of the species has improved somewhat since its listing in 1990 and its population is currently considered to be stable (USFWS 2013a). Recent records indicate this species has expanded into approximately 25 miles of the lower Arkansas River in Arkansas and 200 miles of the Atchafalaya River in Louisiana (USFWS 2012, 2013a). Increased monitoring efforts and improved sampling techniques since its listing have led to additional observations in many portions of its range; however, the overall population size has not been accurately quantified and life history information is still limited. Prior to its listing, pallid sturgeons disappeared from large segments of previously occupied habitat between reservoirs on the Missouri and Yellowstone Rivers in South Dakota, North Dakota, and Montana. Conservation and hatchery programs were largely started in response to extirpations and steep declines, and have been successful in restocking native waterways since 1997. However, without supplementation from hatchery programs the species would most likely face continued declines.

The NatureServe online database lists the population at 2,500 to 100,000 individuals; however, in 1996 Duffy, Berry, and Keenlyne estimated the range-wide population size may be as few as 6,000 or as many as 21,000 individuals. NatureServe (2013) reports the short-term population trend as a decline of 10% to 30%, based on a continued lack of natural recruitment, and the long-term trend as a decline of 30% to 50%.

5.17.3 Current Threats

The primary threats to the pallid sturgeon include impoundments due to dam construction, river channelization and bank stabilization, and alterations of water conditions resulting from dam effluence, including hydrology, turbidity, temperature, and hydrography (EPA 2007; USFWS 2013a). Approximately 51% of the historical range of the pallid sturgeon has been channelized, 28% has been impounded, and the remaining areas are mainly located below dams where habitats and water conditions have been altered (Gerrity, Guy, and Gardner 2008). Dams have not only altered both upstream and downstream habitats, but they have severely fragmented the historical range of the pallid sturgeon and interfered with seasonal migrations to spawning and feeding areas (EPA 2007). The USFWS (1990) has identified habitat loss due to dredging operations, irrigation diversions, and the installation of flood control structures as current threats to the pallid sturgeon. Loss of individual sturgeon due to entrainment in hydroelectric dam facilities and dredging equipment has also been documented, although the overall effects of this on the species has not been determined (USFWS 2013a). Although the Mississippi River has not been impounded below the confluence with the Missouri River, many of its larger tributaries have been. This has led to lowered sediment transport to the main stem of the Mississippi River, resulting in channel degradation and a reduction of shallow water habitats that has negatively affected the species (EPA 2007). Water quality degradation, in the form of industrial and agricultural contaminants or lowered dissolved oxygen levels, are of concern throughout the pallid sturgeon's range, and can have an immediate and long-term effect on the species. The lack of natural reproduction been identified as a threat to the species (McKean 2003; EPA 2007). Spawning has been rare in most parts of the range for the past 30 to 40 years (lack of juveniles being collected), and many fish that are reproducing successfully today were spawned before the construction of many of the dams. Hatchery releases have been successful since 1997 and appear to be keeping populations stable. Commercial and recreational fishing also represents a threat to pallid sturgeons; misidentification of juveniles and younger adults of this species as shovelnose sturgeon (*Scaphirhynchus platorynchus*) has resulted in the documented take of individuals (USFWS 2009).

5.17.4 Potential Presence in the Action Area

Definition of the Action Area

The Action Area for pallid sturgeons includes the intersection of the project disturbance footprint with the Mississippi River and all side channels, and extends 100 feet upstream and 300 feet downstream of any crossings. Specifically, the Action Area includes areas within the banks of the main channel of the Mississippi River and the smaller side channel located to the west of Island Number 35 ([hereafter referred to as Side Channel A]; see Figure 5.17-3, "Potential Presence of Pallid Sturgeon in the Action Area").

Presence in the Action Area Based on Existing Data

The USFWS (2013a, 2014) has identified occupied pallid sturgeon habitat in the Action Area in the segment of the Mississippi River near the boundary between Mississippi County in northeastern Arkansas and Tipton County in southwestern Tennessee. The Project would traverse the main channel of the Mississippi River in Tipton County, Tennessee, as well as Side Channel A that forms the boundary between Arkansas and Tennessee (see Figure 5.17-3, "Potential Presence of Pallid Sturgeon in the Action Area"). Travelling west to east along the proposed route, the transmission line would cross Side Channel A between Arkansas and Island Number 35 in Tipton County, Tennessee, and connect to a new tower on the island. Heading east from the tower on Island Number 35 the transmission line would span the main channel of the Mississippi River, which is more than 2,500 feet wide at this location.

Pallid sturgeons are present in the main stem of the Mississippi River and may be present in side channels with adequate flow, including Side Channel A between Mississippi County, Arkansas and Island Number 35. Due to the seasonal fluctuations in width, depth, and flow, pallid sturgeons have a lower likelihood to be present in Side Channel A than in the main stem of the Mississippi River. The width of this channel varies seasonally; review of aerial imagery indicates a high-flow width of approximately 130 feet and a low-flow width of 20 to 30 feet. This channel appears to be relatively shallow and circumvents Island Number 35 for a distance of over twelve miles before entering a larger side channel of the Mississippi River located downstream and south of Island Number 35 and approximately 400 feet south and downstream of the proposed Project (hereafter referred to as Side Channel B) (see Figure 5.17-3, "Potential Presence of Pallid Sturgeon in the Action Area"). Side Channel B is up to 1,000 feet wide in locations and may also support pallid sturgeons.

Pallid sturgeons are not present at any other Project waterbody crossings, although the Project would cross two other rivers that support pallid sturgeons at locations far downstream of the proposed route: the St. Francis River and the Arkansas River. Pallid sturgeons are present in the lower St. Francis River in Arkansas below the W. G. Huxtable Pumping Plant, more than 20 river miles downstream and more than 250 river miles downstream of the respective Project crossings (see Figure 5.17-2, "Pallid Sturgeon Range in the Vicinity of the Project").

Additional Desktop/Field Analyses

This analysis assumes presence of this species in the Mississippi River, Side Channel A, and Side Channel B. No additional desktop studies or field surveys are required to inform the BA regarding potential impacts on this species.

5.17.5 Direct and Indirect Impacts

Direct Mortality/Injury

Excavation, vehicle and equipment travel, or other Project activities in waterbodies that potentially support the pallid sturgeon would be unlikely to result in injuries to or mortalities of adult pallid sturgeons because they are large enough to quickly leave the Project area; however, there is a small potential for their larvae or their eggs to become entrained, crushed, or otherwise impacted. To avoid or minimize the potential for these direct impacts, Clean Line will, as a general rule, avoid excavation, placement of structure foundations, building of new access roads, or other construction activities within the OHWM of the Mississippi River and Side Channel A. When possible, the Project will make use of existing access roads to reach structure sites in this area, including structure locations on Island Number 35. Clean Line may need to barge equipment across Side Channel A to Island 35. Clean Line will obtain approval from the USFWS and applicable state resource agencies prior to conducting any in-stream disturbance activities.

Accidental spills of hazardous materials resulting from Project activities, such as diesel fuel, gasoline, oil, or hydraulic fluids from construction or O&M equipment, into the Mississippi River or its side channels could result in mortality or injury of individual pallid sturgeons, their larvae, or their eggs if these come in direct contact with the contaminant. Even if hazardous materials do not immediately enter aquatic habitats, subsequent heavy rains or flooding could transport these materials from adjacent areas into occupied waterbodies. In addition, spills of herbicides, over-spraying of herbicides, or off-label use of herbicides (i.e., those not approved for use near aquatic habitats) anywhere in or adjacent to waterbodies during noxious weed control activities could similarly result in mortality or injury of pallid sturgeons. If accidental spills of hazardous materials were to occur, they would be immediately contained and properly cleaned up with on-site spill response kits.

Short-term increases in sediment loads and turbidity in aquatic habitats resulting from grading, excavating, and other construction-related ground disturbances, could injure or adversely affect adult pallid sturgeons, or their eggs or larvae; however, mortality is not likely. Pallid sturgeons are adapted to the historically high turbidity levels of the Mississippi and Missouri rivers that fluctuate seasonally and annually (Duffy, Berry, and Keenlyne 1996; USFWS 2013a).

Because Clean Line will prohibit excavation, placement of structure foundations, building of new access roads, or other construction activities within the OHWM of the Mississippi River and Side Channel A, increases in sediment loads and turbidity in these waterbodies are not anticipated. The Project would implement a number of EPMs and species-specific measures designed to avoid or reduce the potential for impacts on pallid sturgeons from hazardous materials spills and increased sedimentation, including refueling and maintenance buffers (GE-14), herbicide use standards (GE-5), and use of proper erosion control devices (GEO-1). In addition, the Project will develop and implement a SWPPP to control sedimentation, erosion, and runoff from disturbed areas (see Section 2.5, "Environmental Protection Measures") which will also avoid and minimize impacts on pallid sturgeons.

Sensory Disturbance

Project-related activities are not likely to result in impacts on pallid sturgeons through sensory disturbances. Permanent structures would all be sited outside of the banks of waterways occupied by this species, and the activities associated with construction of transmission lines of this size would typically not cause loud noises, or excessive ground vibrations or visible disturbance near the water. Some noise and vibration could occur during excavation of the structure footings adjacent to waterways, depending on substrates, but these impacts would be very small and short-term. In general, any sensory impacts would occur at the time of the construction disturbances, and any effects on pallid sturgeons should be minimal and dissipate soon thereafter. However, Clean Line will minimize the potential for these impacts through the protection measures described below (see Section 5.17.6, "Protection Measures").

Habitat Loss/Alteration

There is a very small potential that Project-related activities could result in indirect impacts on pallid sturgeon through loss or alteration of habitat. However, any potential impacts that may occur as a direct result of Project-related construction activities are expected to be negligible, after implementation of all EPMs and species-specific measures.

Hazardous material spills, including releases of diesel fuel, gasoline, oil, hydraulic fluids, and herbicides, in or adjacent to the Mississippi River or Side Channel A could adversely affect water and soil conditions and the health of aquatic plants and riparian vegetation at the Project crossing or at downstream locations. In particular, heavy rains subsequent to spills could transport hazardous materials into occupied habitat. Over-spraying of herbicides or off-label use of herbicides (i.e., those not approved for use near aquatic habitats) anywhere in or adjacent to waterbodies during noxious weed control activities could result in short-term degradation of aquatic habitats by damaging or removing native plant species in the water or on river banks. The Project will implement EPMs and species-specific measures designed to avoid or reduce the potential for impacts on habitat from hazardous materials spills and increased sedimentation, including application of refueling and maintenance buffers (see Section 5.17.6.1, "Environmental Protection Measures").

Loss of riparian trees and other vegetation on the banks of streams could affect habitat quality by increasing sediment loads through overland erosion or by the cutting and sloughing of banks. Acute increases in levels of siltation or sedimentation could render waters unsuitable for egg hatching or larva development. However, most potential increases in sedimentation and turbidity due to construction would be minor and short-term. When possible, vegetation removal would be minimized by cutting vegetation to a height of no less than 6 feet within a buffer zone 100 feet from the OHWM (i.e., the river buffer zone), except where necessary for access (USFWS 2014)

Because of the high volume of water flow in the Mississippi River and its channels, any spills of hazardous materials or increased sedimentation would quickly dissipate or become diluted downstream of the Project crossing site. Therefore, any remaining impacts on habitat are likely to be negligible or minimal and short-term. The Project would implement a number of EPMs and species-specific measures designed to avoid or reduce the potential for these impacts, including refueling and maintenance buffers (GE-14); when possible, vegetation removal would be minimized by cutting vegetation to a height of not less than 6 feet within a buffer zone 100 feet from the OHWM (i.e., the river buffer zone), except where necessary for access (species-specific measure), herbicide use standards (GE-5), and use of proper erosion control devices (GEO-1). In addition, the Project will develop and implement a SWPPP to control sedimentation, erosion, and runoff from disturbed areas (see Section 2.5, "Environmental Protection Measures") which will also avoid and minimize impacts on pallid sturgeons.

5.17.6 Protection Measures

Clean Line will use a number of measures to avoid and minimize impacts on pallid sturgeons. These measures include many of the Clean Line-designated EPMs outlined in Section 2.5, "Environmental Protection Measures," and additional species-specific measures. Collectively, the EPMs and species-specific measures are referred to as "protection measures."

5.17.6.1 Environmental Protection Measures

The following EPMs—general (GE); soil (GEO); fish, vegetation, and wildlife (FVW); and waters, wetlands, and floodplains (W)— to be implemented by the Project will contribute to avoiding and/or minimizing impacts on pallid sturgeons:

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits.
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-4) – Vegetation removed during clearing will be disposed of according to federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).

- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-9) – Clean Line will avoid and/or minimize damage to drainage features and other improvements such as ditches, culverts, levees, tiles, and terraces; however, if these features or improvements are inadvertently damaged, they will be repaired and or restored.
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies, and groundwater wells, or as otherwise required by federal, state, or local regulations.
- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.
- (GE-21) – Clean Line will maintain construction equipment in good working order. Equipment and vehicles that show excessive emissions of exhaust gasses and particulates due to poor engine adjustments or other inefficient operating conditions will be repaired or adjusted.
- (GE-27) – Clean Line will minimize compaction of soils and rutting through appropriate use of construction equipment (e.g., low ground pressure equipment and temporary equipment mats).
- (GE-28) – Hazardous materials and chemicals will be transported, stored, and disposed of according to federal, state, or local regulations or permit requirements.

Soils EPM:

- (GEO-1) – Clean Line will stabilize slopes exposed by its activities to minimize erosion.

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-2) – Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.

Waters, Wetlands, and Floodplains Measures:

- (W-1) – Clean Line will avoid and/or minimize construction of access roads in special interest waters.
- (W-2) – Clean Line will identify, avoid, and/or minimize adverse effects to wetlands and waterbodies. Clean Line will not place structure foundations within the OHWM of Waters of the United States.
- (W-3) – Clean Line will establish streamside management zones within 50 feet of both sides of intermittent and perennial streams and along margins of bodies of open water where removal of low-lying vegetation is minimized.
- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.
- (W-5) – Clean Line will construct access roads to minimize disruption of natural drainage patterns including perennial, intermittent, and ephemeral streams.
- (W-6) – Clean Line will not construct counterpoise or fiber optic cable trenches across waterbodies.
- (W-7) – Clean Line will locate spoil piles from foundation excavations and fiber optic cable trenches outside of streamside management zones.
- (W-8) – Dewatering will be conducted in a manner designed to prevent soil erosion (e.g., through discharge of water to vegetated areas and/or the use of flow control devices).
- (W-15) – Clean Line will seek to procure water from municipal water systems where such water supplies are within a reasonable haul distance; any other water required will be obtained through permitted sources or through supply agreements with landowners.

5.17.6.2 Species-specific Measures

In addition to the EPMs described above, the Project will implement the following species-specific measures that will further contribute to avoiding and/or minimizing impacts on the pallid sturgeon:

- Clean Line will not excavate or disturb substrates within the OHWM of the Mississippi River or Side Channel A.
- Clean Line will avoid construction of new access roads within the OHWM of the Mississippi River or Side Channel A, if possible, and will attempt to use existing access roads to access Island 35. However, Clean Line may need to barge equipment across Side Channel A to access Island 35.
- Clean Line would minimize vegetation removal along the Mississippi River and Side Channel A by maintaining vegetation at a height of 6 feet within a buffer zone 100 feet from the OHWM (i.e., the river buffer zone), except where necessary for access (USFWS 2014).
- If Clean Line determines that excavation, travel through, or other construction activities are required within the OHWM of the Mississippi River or Side Channel A, then Clean Line will coordinate with the USFWS and applicable state resource agencies to identify site-specific measures to avoid or minimize impacts to the extent possible.

5.17.7 Effects Determination

Clean Line expects to avoid all or most impacts on pallid sturgeons by prohibiting excavation and most other construction activities within the OHWM of the Mississippi River and Side Channel A. However, some soil disturbances may be required in adjacent riparian areas. Clean Line will implement vegetation clearing methods within the river buffer zone that will avoid or minimize soil disturbance. Potential impacts on root structure are expected to be minimal and in many areas avoided altogether, and functionality of the habitat for pallid sturgeon should not be affected. In addition, Clean Line may need to barge equipment across Side Channel A to access Island 35. Taking into consideration the proposed Project design as well as the implementation of the aforementioned EPMs and species-specific measures proposed by Clean Line, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project "may affect, but is not likely to adversely affect" the pallid sturgeon.

The pallid sturgeon does not currently have designated critical habitat; therefore, the Project "will not destroy or adversely modify" critical habitat for the species.

5.18 Yellowcheek Darter

In the USFWS April 10, 2013 response letter to the DOE regarding the Notice of Intent to Prepare an Environmental Impact Statement for the Plains and Eastern Clean Line Transmission Project, and their April 2, 2014 clarification letter, the USFWS identified the yellowcheek darter (*Etheostoma moorei*) as one of the federally listed species that occurs within the Arkansas portion of the Project, specifically in Cleburne and Van Buren Counties (USFWS 2013, 2014). However, Clean Line has found no evidence that the yellowcheek darter is present in waterbodies crossed by the Project. The yellowcheek darter was historically present in Little Red River and its tributaries, including the South Fork, Middle Fork, Archey Fork, and the Devil's Fork in Van Buren, Cleburne, Stone, and Searcy Counties in north-central Arkansas (USFWS 2007, 2012). Construction of the Greers Ferry Lake Dam on the Little Red River in 1962 inundated much of the species' habitat within its range. As a result, the yellowcheek darter is considered extirpated from the inundated portion of the Little Red River that now forms Greers Ferry Lake as well as the lower reaches of the four tributaries listed above (Weston, Johnson, and Christian 2010). Additionally, cold tail-water releases below the dam, where the Project will cross the Little Red River, have extirpated the species from the Little Red River below the dam (Robison and Harp 1981; USFWS 2011). Today this species is considered to be present only to the north of the Project in the four tributaries in the upper Little Red River Watershed listed above, upstream of areas inundated by Greers Ferry Lake (USFWS 2007, 2011).

The Action Area does not overlap with the current range of the yellowcheek darter, nor is it located upstream of occupied habitat; therefore, the proposed Project will have "no effect" on this species. As such, the yellowcheek darter is not discussed in more detail in this document.

5.19 Ozark Hellbender

The USFWS (2011a) listed the Ozark hellbender (*Cryptobranchus alleganiensis bishopi*) as endangered on November 7, 2011, but did not designate critical habitat.

5.19.1 Natural History

Range

Hellbenders are large, strictly aquatic salamanders of which there are two subspecies: eastern hellbender (*C.a. alleganiensis*) and Ozark hellbender (USFWS 2012; MDC 2014). Ozark hellbenders are endemic to the White River drainage in southern Missouri and northern Arkansas (Johnson 2000; USFWS 2011a, 2011b, 2012). Historically, they occurred in portions of the Spring, White, Black, Eleven Point, and Current Rivers and their tributaries, including North Fork White River, Bryant Creek, and Jacks Fork. They are currently known to occur in the North Fork White River, the Eleven Point River, and the Current River (see Figure 5.19-1, "Range of Ozark Hellbender") (USFWS 2011a, 2012). Section 5.19.4, "Potential Presence in the Action Area," discusses in detail the Ozark hellbender's range as it pertains to the Project.

Habitat

Ozark hellbenders are habitat specialists that rely on consistent temperatures, flow, and levels of dissolved oxygen (USFWS 2011a, 2012). They require cool, clear water from which they take in oxygen through capillaries in their skin (USFWS 2011a, 2011b; MDC 2014). Warm or standing water does not provide the dissolved oxygen necessary to support their respiratory needs (USFWS 2011a). Ozark hellbenders sometimes rock or sway in still, warm water to increase their oxygen exposure. Ozark hellbenders also need consistent temperatures, as they acclimate to changes in temperature much slower than other amphibians (Hutchison and Hill 1976). In spring-fed streams, they will typically concentrate in areas downstream of the spring where water temperatures do not notably change throughout the year (USFWS 2011a).

Ozark hellbender adults are often located in moderate to deep (less than 3 feet to 10 feet), fast-flowing permanent streams. Adults are usually found beneath large, flat limestone or dolomite rocks (Johnson 2000; USFWS 2011a, 2011b, 2012; MDC 2014). Larvae and juveniles also may occur under large rocks, but may hide under small stones in gravel beds as well (USFWS 2011b, 2012). Ozark hellbenders are territorial and will defend occupied cover sites from other hellbenders (Nickerson and Mays 1973; USFWS 2011a). They have small home ranges, which average about 92 square feet for females and 266 square feet for males (Peterson and Wilkinson 1996; USFWS 2011a).

Breeding

Ozark hellbenders become sexually mature between 5 and 8 years of age, and may live 30 to 35 years in the wild (Nickerson and Mays 1973; USFWS 2011a, 2011b, 2012; MDC 2014). Males mature at a younger age (approximately 5 years of age) than do females (USFWS 2011a). Females mature at 6 to 8 years of age, and may breed only every 2 to 3 years (USFWS 2011a; MDC 2014). Mating generally occurs between September and November, when clutches of 138 to 700 eggs are fertilized externally (Johnson 2000; USFWS 2011a, 2011b, 2012; MDC 2014). Males construct nests under large rocks, within bedrock, or beneath submerged logs (USFWS 2012). The males guard the fertilized eggs from predators (including other hellbenders) for about 80 days until they hatch (Nickerson and Mays 1973; USFWS 2011a, USFWS 2011b, 2012; MDC 2014).

Feeding

Adult Ozark hellbenders remain under cover during the day, and emerge at night to forage (USFWS 2011a, 2011b). Crayfish comprise about 90% of adult diets, while aquatic insects are believed to be the main food source of larvae. Adults may also eat small fish and aquatic insects, and will cannibalize the eggs of their own clutches and the clutches of other adults (USFWS 2011a, b; MDC 2014). Females sometimes eat their own eggs as they are laying them, or may retain eggs and reabsorb them (Nickerson and Mays 1973; USFWS 2011a). Ozark hellbenders are scent-based scavengers as well, and as a result are occasionally caught on fishing lines (USFWS 2011b).

5.19.2 Population Status

Wheeler et al. (2003) indicate that Ozark hellbender populations have declined by at least 70% over 20 years in both the Eleven Point and North Fork White Rivers (USFWS 2011a, 2012). Wheeler et al. (2003) also noted a reduction in recruitment and shift in age-class structure to older individuals (USFWS 2012). According to the USFWS (2011a, 2012), no populations of Ozark hellbenders appear to be stable. In 2006, the Conservation Breeding Specialist Group facilitated a Population and Habitat Viability Analysis for the Ozark hellbender and estimated 590 individuals remained in the wild (Briggler et al. 2007; USFWS 2011a, 2012). Table 5.19-1, "Population Estimates of Ozark Hellbenders by River and State," presents the population estimates by river and state (Briggler et al. 2007).

The USFWS (2011a) does not know whether a viable population of Ozark hellbenders exists (or is able to exist) in the main stem of the White River in Arkansas. Two records from this river exist, including one individual recorded in 1997 in Baxter County, and a record of another individual caught by an angler in Independence County in 2003. Individuals caught in the main stem of the White River may be a relict population separated by the North Fork White River population by the Norfork Reservoir (USFWS 2011a).

Table 5.19-1
Population Estimates of Ozark Hellbenders by River and State

River	State	Population Estimate
North Fork White River /Bryant Creek	Missouri	200
Eleven Point River	Missouri	100
	Arkansas	200
Current River/Jack's Fork	Missouri	80
Spring River	Arkansas	10

Source: Briggler et al. 2007.

5.19.3 Current Threats

Habitat degradation is considered one of the most likely causes of the Ozark hellbender's decline (USFWS 2011a). Ozark hellbenders are habitat specialists that require consistent temperatures, flow, and levels of dissolved oxygen, so even minor habitat alterations are likely to have detrimental effects on populations (USFWS 2011a, 2012). Dams have had notable effects on the Ozark hellbender's habitat creating still, deep-water habitats with higher surface water temperatures and reduced dissolved oxygen levels. Dams also fragment habitat, creating barriers that result in smaller, isolated populations (USFWS 2011a, 2012).

Other anthropogenic activities negatively impact Ozark hellbender habitats. Mining (i.e., gravel, zinc, lead) may result in habitat removal, increased turbidity, bank erosion, siltation, and contamination that effect Ozark hellbenders and potentially their primary food source, the crayfish. Water quality also may be negatively affected by pollution resulting from increased human waste, fertilizers, logging, and expanded industrial agricultural practices (USFWS 2011a, 2012). Most of the rivers and streams occupied by Ozark hellbenders are popular recreation spots as well, and disturbance from aquatic sports, off-road vehicles, and other recreational activities may directly impact the subspecies (USFWS 2011a, 2011b).

Collecting Ozark hellbenders for research, education, and the pet trade has also contributed to their decline (USFWS 2011a, 2011b, 2012). The states of Arkansas and Missouri have halted legal collection of Ozark hellbenders, although Missouri does issue limited permits for research purposes. Illegal collection for the pet trade continues to be a threat. Japan is probably the largest market for Ozark hellbenders, and their market (in Japan or elsewhere) is likely to increase as the rarity of the subspecies becomes more public (USFWS 2011a). The USFWS, Missouri Department of Conservation, and Arkansas Game and Fish Commission have taken steps to keep known locations of Ozark hellbenders confidential to combat illegal collection (USFWS 2011a, 2012).

Disease and predation may also pose threats to the continued existence of Ozark hellbenders. Amphibian chytrid fungus was discovered in all extant Ozark hellbender populations in 2006. This pathogen has proven to be fatal to captive Ozark hellbenders. A variety of morphological abnormalities (e.g., limb deformities, blindness, epidermal lesions) have been observed in Ozark hellbenders dating back to 1990. Abnormalities are becoming increasingly common and severe, possibly fatal. It is unknown if abnormalities are associated with amphibian chytrid fungus (USFWS 2011a, 2011b, 2012). Predation may also contribute to the decline of Ozark hellbenders, particularly by non-native trout and other stocked piscivorous fish on hellbender larvae (USFWS 2011a, 2012).

Climate change may pose a future threat to Ozark hellbenders (USFWS 2011a, 2012). Habitat quality may be decreased by the potential for increased frequency and duration of droughts. Droughts would likely result in prolonged low stream flows, elevated water temperatures, and decreased dissolved oxygen levels. Elevated water temperatures could increase the susceptibility of Ozark hellbenders to bacterial and fungal infections (USFWS 2011a).

5.19.4 Potential Presence in the Action Area

Definition of the Action Area

The Action Area for the Ozark hellbender includes the project disturbance footprint's intersection with the main stem of the White River in Jackson County, Arkansas (see "Range" in Section 5.19.1 "Natural History"). The Action Area extends 100 feet upstream and 300 feet downstream of the crossing to account for potential impacts from increased sediment load and turbidity, and spills of hazardous materials. The upstream and downstream buffers reflect USFWS (2014) recommendations for mussel survey areas. The USFWS mussel recommendations are being applied to the Ozark hellbender because, like mussels, Ozark hellbenders are slow-moving with relatively small home ranges (Peterson and Wilkinson 1996; USFWS 2011a).

Presence in the Action Area Based on Existing Data

The potential presence of Ozark hellbenders in the Action Area is limited to the Project's crossing of the main stem of the White River in Jackson County, Arkansas (see Figure 5.19-1, "Range of Ozark Hellbender"). There are only two records of Ozark hellbenders from the main stem of the White River, which includes one each in Baxter, and Independence Counties, 1997 and 2003, respectively (USFWS 2011a). The USFWS (2011a) does not know if a viable population of Ozark hellbenders exists, or if existing conditions can support populations in the White River. Much of the potential habitat for Ozark hellbenders on the main stem of the White River was destroyed by dam construction on the Upper White River in the 1940s and 1950s. Records of the subspecies on the main stem of the White River may have been individuals of a relict population separated from the North Fork White River population by the Norfork Reservoir (USFWS 2011a).

Additional Desktop/Field Analyses

Clean Line will assume presence of Ozark hellbenders in the White River at the Project crossing in Jackson County, Arkansas. Based on this conservative assumption, no additional desktop studies or field surveys are planned.

5.19.5 Direct and Indirect Impacts

Direct Mortality/Injury

Excavation, travel through, or other Project activities that include contact with bottom sediments or substrates will not be required in the main stem of the White River. Injuries to or mortalities of Ozark hellbenders will, therefore, not occur as a direct result of Project-related in-stream construction activities.

Accidental spills of hazardous materials from construction or operations and maintenance equipment, including diesel fuel, gasoline, oil, and hydraulic fluids, into occupied waterbodies could result in direct, adverse impacts if Ozark hellbender adults, larvae, or eggs come in contact with the contaminant. Even if hazardous materials were not directly spilled into aquatic habitats, subsequent rain events or flooding could transport these materials into receiving streams, rivers, or wetlands and may indirectly result in mortality or illness. Over-spraying of herbicides or off-label use of herbicides (i.e., those not approved for use near aquatic habitats) during noxious and invasive weed control could also result in mortality or illness of Ozark hellbenders that come into contact. Accidental spills of hazardous materials will be immediately contained and properly cleaned up with on-site spill response kits. In addition, the Project will implement EPMs and species-specific measures designed to avoid or reduce the potential for impacts on habitat from hazardous materials spills and stormwater pollution, including application of refueling and maintenance buffers (GE-14), herbicide use standards (GE-5), and use of proper erosion control devices (GEO-1).

Sensory and Respiratory Disturbance

Project-related activities could also result in direct impacts on Ozark hellbenders through sensory and respiratory disturbances, including noise and ground vibration. Ozark hellbenders require cool, clear water to respire, because they take in dissolved oxygen from water through their skin (USFWS 2011a, 2011b; MDC 2014). Increasing turbidity or altering water levels would inhibit their ability to respire. In-stream disturbance activities would not occur in the main stem of the White River, which negates most impacts associated with sensory and respiratory disturbance; however, Project activities (e.g., clearing, excavation) in adjacent riparian areas have the potential to cause ground vibrations that cause sensory disturbances or stir up sediment. In general, these impacts would occur at the time of the disturbances, and any effects on Ozark hellbenders should lessen and dissipate soon thereafter. However, Clean Line will minimize the potential for this impact through the EPMs in Section 5.19.6.1, "Environmental Protection Measures."

Habitat Loss/Alteration

Project-related activities could result in indirect impacts on Ozark hellbenders through loss or alteration of stream habitats used by Ozark hellbenders, which have specialized habitat requirements. Project activities could alter water levels, flow, turbidity, temperatures, and levels of dissolved oxygen, which would impact an individual's ability to respire. The Project may also indirectly impact Ozark hellbenders if large rocks and large logs used for cover by adults and larvae, and small stones in gravel beds, are removed or disturbed. Similarly, indirect impacts would occur if stream habitat alterations negatively affected their primary food source (i.e., crayfish). The Project will avoid excavation, travel through, or other Project activities that include contact with bottom sediments or substrates in suitable habitat in the main stem of the White River and implement the protection measures in Section 5.19.6, "Protection Measures," to avoid and minimize impacts on Ozark hellbenders.

Accidental hazardous material spills and the over-spraying of herbicides or the use of incorrect herbicides (i.e., those not approved for use near aquatic or riparian vegetation) during noxious and invasive weed control could result in short-term degradation of aquatic habitats by damaging or removing native plant species, which could alter the water temperature and stream flow and impact Ozark hellbenders. Clean Line will implement EPMs, such as W-4 (see Section 5.19.6.1, "Environmental Protection Measures"), to avoid or minimize impacts associated with spills and herbicides.

Loss or degradation of riparian trees and other vegetation on the banks of streams could negatively affect habitat quality by raising water temperatures and increasing erosion and sediment loads. Increases in water temperatures and levels of siltation in the water column or on substrates could render habitats unsuitable for Ozark hellbenders, which are habitat specialists that require consistent temperatures and water flows. Impacts on herbaceous and shrubby vegetation would be short term, while removal of forested vegetation from riparian zones would be long term or permanent (lasting the life of the Project). However, vegetation removal would be minimized by cutting vegetation to a height of no less than 6 feet within a buffer zone extending 100 feet from the OHWM (USFWS 2014).

Increased Predation

The Project could indirectly increase predation of Ozark hellbender adults, larvae, and eggs if important cover (i.e., large rocks and logs, small stones in gravel beds) are removed or disturbed during any phase of the Project. Clean Line is expected to span the main stem of the White River and will require no in-stream disturbance activities. Therefore, no impacts associated with increased predation are expected for Ozark hellbenders.

5.19.6 Protection Measures

Clean Line will use a number of measures to avoid or minimize impacts on Ozark hellbenders. These measures include many of the EPMs outlined in Section 2.5, "Environmental Protection Measures," and an additional species-specific measure recommended by the USFWS (2014) for aquatic species. Collectively, the EPMs and species-specific measures are referred to as "Protection Measures."

5.19.6.1 Environmental Protection Measures

The following EPMs—general (GE); soils (GEO); fish, vegetation, and wildlife (FVW); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on Ozark hellbenders.

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits.
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-4) – Vegetation removed during clearing will be disposed of according to federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.

- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-9) – Clean Line will avoid and/or minimize damage to drainage features and other improvements such as ditches, culverts, levees, tiles, and terraces; however, if these features or improvements are inadvertently damaged, they will be repaired and or restored.
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies, and groundwater wells, or as otherwise required by federal, state, or local regulations.
- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.
- (GE-28) – Hazardous materials and chemicals will be transported, stored, and disposed of according to federal, state, or local regulations or permit requirements.
- (GE-31) – Clean Line will provide sanitary toilets convenient to construction; these will be located greater than 100 feet from any stream or tributary or to any wetland. These facilities will be regularly serviced and maintained; waste disposal will be properly manifested. Employees will be notified of sanitation regulations and will be required to use sanitary facilities.

Soils EPM:

- (GEO-1) – Clean Line will stabilize slopes exposed by its activities to minimize erosion.

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-2) – Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.

Waters, Wetlands, and Floodplains EPMs:

- (W-1) – Clean Line will avoid and/or minimize construction of access roads in special interest waters.
- (W-2) – Clean Line will identify, avoid, and/or minimize adverse effects to wetlands and waterbodies. Clean Line will not place structure foundations within the OHWM of Waters of the United States.
- (W-3) – Clean Line will establish streamside management zones within 50 feet of both sides of intermittent and perennial streams and along margins of bodies of open water where removal of low-lying vegetation is minimized.
- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.
- (W-5) – Clean Line will construct access roads to minimize disruption of natural drainage patterns including perennial, intermittent, and ephemeral streams.
- (W-6) – Clean Line will not construct counterpoise or fiber optic cable trenches across waterbodies.
- (W-7) – Clean Line will locate spoil piles from foundation excavations and fiber optic cable trenches outside of streamside management zones.
- (W-8) – Dewatering will be conducted in a manner designed to prevent soil erosion (e.g., through discharge of water to vegetated areas and/or the use of flow control devices).

5.19.6.2 Species-specific Measures

In addition to the EPMs described above, Clean Line will adhere to the following species-specific measures based on recommendations for aquatic species from the USFWS (2014):

- Where presence is documented or through coordination with the USFWS, vegetation removal would be minimized by maintaining vegetation at a height of 6 feet within a buffer zone 100 feet from the OHWM (i.e., the river buffer zone), except where necessary for access (USFWS 2014). Following construction activities, Clean Line will re-seed with grass seed and plant river cane on the top of the bank with areas further back from the bank being sumac, blackberry, shrub willow species, or other native woody shrubs along the river buffer zone located on the ROW.

5.19.7 Effects Determination

Much of the potential habitat for Ozark hellbenders on the main stem of the White River was destroyed by dam construction in the 1940s and 1950s, and the USFWS (2011a) does not know if a viable population of Ozark hellbenders exists, or if existing conditions can support them in the White River. There are only two documented occurrences of the species in the main stem of the White River dating back over 10 years. The Project is expected to span the White River and will require no in-stream work. Additionally EPMs, species-specific measures, and an approved SWPPP to prevent erosion and pollution spills would be implemented (see Section 5.19.6, “Protection Measures”) which would avoid or minimize impacts on Ozark hellbenders.

There is a low likelihood that Ozark hellbenders are present in the main stem of the White River. However, taking into consideration the proposed Project design as well as the implementation of the aforementioned EPMs and species-specific measures proposed by Clean Line, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project "may affect, but is not likely to adversely affect" Ozark hellbenders.

Ozark hellbenders do not currently have designated critical habitat; therefore, the Project will not adversely affect critical habitat.

5.20 Florida Panther

In their April 10, 2013 response letter to the Department of Energy regarding the Notice of Intent to Prepare an Environmental Impact Statement for the Plains and Eastern Clean Line Transmission Project, and their April 2, 2014 clarification letter, the USFWS identified the Florida panther (*Felis concolor coryi*) as one of the federally-listed species that occurs within the Arkansas portion of the Project. The Florida panther's historic range included Florida, Georgia, Alabama, Mississippi, Arkansas, and Louisiana, and extended into eastern South Carolina and southern Tennessee (USFWS 2008). However, the species is considered extirpated in Arkansas and has not been confirmed in the state since the 1920s. "It is the position of the Arkansas Game and Fish Commission that this subspecies has been eradicated from the state and any mountain lion in the wild in Arkansas is not an endangered Florida panther unless proven otherwise" (Ledbetter 2003). The current range of the Florida panther is limited to southern and south-central Florida (USFWS 2008). As such, the Florida panther is not discussed in detail in this document. The Action Area does not overlap with any of the current range of the Florida panther; therefore, the proposed Project will have "no effect" on this species.

5.21 Gray Bat

The USFWS listed the gray bat (*Myotis grisescens*) as endangered under the ESA on April 28, 1976 (USFWS 1976). The USFWS has not designated critical habitat for the gray bat.

5.21.1 Natural History

Range

The gray bat occurs in limestone karst regions of 14 states in the southeast (Tuttle 1975; USFWS 1982, 1997). The majority of the population occurs in Alabama, northern Arkansas, Kentucky, Missouri, and Tennessee, with smaller populations present in northwestern Florida, western Georgia, southeastern Kansas, southern Indiana, southern and southwestern Illinois, northeastern Oklahoma, northeastern Mississippi, western Virginia, and possibly western North Carolina (USFWS 1997, 2009). Section 5.21.4, "Potential Presence in the Action Area," discusses the species' range relative to the Project.

Feeding

The gray bat is strictly insectivorous, consuming a variety of flying insect species with a preference for mayflies, caddisflies, and stoneflies (USFWS 2009). Forested riparian areas, wetland complexes, and areas near ponds and reservoirs provide abundant supplies of insects for gray bats. They typically forage near the surface of open water (10 feet) (Tuttle 1976; USFWS 2009). Maternity colonies are typically located within 2.5 miles of foraging habitats, but gray bats may travel up to 22 miles between feeding areas and occupied caves. Gray bats emerge from summer roosts in the early evening and usually fly direct routes to their foraging sites (Martin 2007).

Spring and Summer Ecology

Gray bats are cave obligates (using caves year-round) that emerge from their hibernacula in the spring from late March to early April (USFWS 2009). Adult females are the first to disperse from hibernacula and migrate to their summer range (Martin 2007). Adult males and juveniles (gray bats reach sexual maturity at two years) disperse later, migrating between mid-April and mid-May (Tuttle 1976; Martin 2007; USFWS 2009). Migrations often range from 10.5 to 23 miles, but distances as great as 480 miles have been documented. Female gray bats exhibit fidelity to their summer ranges, but may roost in several different caves within their range (Martin 2007; USFWS 2009).

Reproductive females congregate at maternity caves in their summer habitat, forming colonies of up to tens of thousands (Martin 2007; USFWS 2009). Males form bachelor groups, which may also include juveniles of both sexes, and roost in different caves than the reproductive females (Martin 2007). Gray bats select warmer caves and sometimes human-made sites in the summer. Summer caves range in temperature from 57 degrees Fahrenheit (°F) to 77°F with maternity sites containing structural heat traps, which capture metabolic heat from clustered individuals to support juvenile development (Tuttle 1976; Martin 2007; USFWS 2009).

Females become pregnant after their spring emergence (mating discussed below in "Fall and Winter Ecology") and, after 60 to 70 days, give birth to a single pup in late May or early June (Tuttle 1976; Martin 2007; USFWS 2009). The young cling to the mother for about one week, and then remain in the maternity cave while their mothers forage for an additional three weeks (Martin 2007). The young become volant (i.e., are able to fly) at four weeks of age, at which point their growth rates and survival are largely dependent on the commuting distances between their roosts and foraging sites (Tuttle 1976; Martin 2007). Gray bats become more transient within their summer range after young have become volant, and will frequently use alternate roost sites (Martin 2007).

Fall and Winter Ecology

Fall migration takes place between early September and mid-October (Tuttle 1976; USFWS 2009). Gray bats return to the same hibernacula each year and mate upon arrival at winter caves (Tuttle 1976; Martin 2007; USFWS 2009). Females store sperm and delay fertilization until after spring emergence (Martin 2007; USFWS 2009). Adult females enter the hibernacula first, while adult males may stay active outside their hibernacula until early November before entering hibernation (Martin 2007). Juvenile gray bats also begin hibernation after adult females.

Gray bats become torpid during hibernation, which drops their body temperatures to near ambient temperatures and allows them to conserve fat reserves to sustain them until their spring emergence (Martin 2007). They also tend to hibernate in tight clusters (sometimes numbering in the hundreds of thousands) in densities greater than 170 individuals per square foot (Martin 2007; USFWS 2009). Suitable hibernacula are limited, and often are used by gray bats that summer across a large area. Hibernacula differ from their maternity sites in structure and temperature. Winter hibernacula are usually multi-chambered, deep and vertical caves with good airflow and multiple entrances. Hibernacula temperatures usually range from 41°F to 52°F, although 34°F to 39°F may be preferred. Males and females hibernate in the same caves (Martin 2007; USFWS 2009).

5.21.2 Population Status

Studies reviewing gray bat abundance data have indicated that most gray bat populations are either stable or increasing since the 1980s (Sasse et al. 2007; USFWS 2009). When the USFWS' *Gray Bat Recovery Plan* was completed in 1982, the range-wide gray bat population was estimated at 1,657,900 individuals (USFWS 1982; Martin 2007). As of 2006, the population of gray bats was estimated at 3,377,100 individuals, an increase of 104% from 1982 (Martin 2007). Elliott (2008) found that despite population increases between 1980 and 2005, gray bat recovery had only achieved 37% of their historic populations (USFWS 2009).

In Arkansas, at least 350,000 gray bats are estimated to hibernate in five caves, and at least 180,000 gray bats are estimated to use 20 caves during the summer (Harvey, Redman, and Chaney 2005; Martin 2007). Gray bats are considered common in the cave regions of middle and eastern Tennessee (Martin 2007). As of 2002, 38 summer caves housed an estimated 320,930 gray bats, and 631,837 gray bats used five hibernacula in Tennessee. Sasse et al. (2007) estimated that approximately 99,000 gray bats occupied seven maternity caves in Oklahoma. It appears populations in Oklahoma are mainly stable or increasing (Martin 2007).

5.21.3 Current Threats

Gray bats have very specific habitat requirements (they select cold caves in the winter and warm caves located near water in the summer) resulting in 95% of bats using only nine caves (USFWS 2009). Because the majority of the population resides in few locations, the species is particularly vulnerable to impacts from cave disturbance. Sources of cave disturbance that have contributed to the decline of the species include human disturbance, environmental disturbance (e.g., pesticides, pollution), impoundment of waterways, cave commercialization, improper cave gating, and natural causes (e.g., cave flooding or collapse) (USFWS 1982).

In preparation for hibernation, bats store fat reserves to sustain them through the winter when the food supply is scarce. All hibernating bats naturally arouse periodically; however, these arousals are energetically expensive with one arousal equaling 65 days of hibernation in terms of energy expenditure (Thomas, Dorais, and Bergeron1990). Any unnatural arousals resulting from human disturbance force bats to burn a large portion of their limited stored fat, which threatens their survival. If energy reserves are depleted prematurely, the bat may leave the cave during the winter to replenish energy stores and die for lack of adequate food supply (USFWS 1997). During the maternity season, when the young are unable to fly, a disturbance that causes bats to flee the cave can result in mortality, especially for young bats that could be dropped by panicking females (USFWS 1982).

The commercialization and destruction of caves are responsible for the loss of large gray bat colonies (USFWS 1975). Changes to the temperature, airflow, humidity, or light in the cave may cause the bats to abandon their roost due to their unsuitability (USFWS 2009). Gates have been added to multiple cave entrances to discourage vandalism and destruction of bat habitat by humans. Properly installed gates do not deter bats as they continue to inhabit the caves; however, improper gating and other human-made objects that obstruct cave entrances may cause the bats to abandon previously suitable caves (USFWS 2009). The flooding of caves, whether from natural causes or water impoundment, also poses a serious threat. Bats may escape the flood, but finding another suitable home on short notice is problematic for cave obligate bats with highly specific habitat requirements (USFWS 1997).

In May 2012, the USFWS confirmed the presence of white-nose syndrome (WNS) in gray bats in two counties in Tennessee (USFWS 2012a). White-nose syndrome also poses a threat to the gray bat population. The disease was first documented in a New York cave in 2006 and is aptly named for the white fungus, *Geomyces destructans*, which grows on the ears, wings, and nose of hibernating bats. To date, WNS has killed more than 5.7 million bats in 25 U.S. states and five Canadian provinces (USGS 2014; USFWS 2014a). Bats infected with WNS raise their metabolism to initiate an immune response to combat the disease. The extra energy used by the immune system depletes necessary stored fat reserves to survive the winter. Infected bats are often seen exhibiting abnormal behavior, such as flying around outside the cave during the day or congregating around cave entrances searching for food. This behavior often results in either freezing to death or starvation (Bat Conservation International 2013).

Pollution may also indirectly impact gray bats by reducing their prey base. Insects such as mayflies (*Hexagenia* spp.), which are a significant portion of the gray bat diet, cannot survive in polluted water, leaving a gap in the bat's diet (Fremling and Johnson 1989). Agricultural pesticide is also thought to contribute to the decline of insectivorous bat populations.

5.21.4 Potential Presence in the Action Area

Definition of the Action Area

Gray bats may travel up to 22 miles from maternity caves to prime foraging areas; however, most maternity colonies are located within 2.5 miles of their foraging sites (USFWS 2009). Therefore, gray bats residing in caves within 2.5 miles of the Project may be foraging in the Project area. Removal or alteration of potential foraging habitat by the Project may have indirect, negative impacts on gray bats 2.5 miles beyond the Project's ground disturbance. The Action Area for gray bats is considered to be the project disturbance footprint plus a 2.5-mile buffer where potentially suitable foraging habitat, maternity colonies, hibernacula, or other roosts are traversed by the Project within the gray bat's known range. This 2.5-mile Action Area buffer is expected to encompass all potential Project impacts on gray bats. The Project surveyed for potential karst/cave features within a 300-foot corridor along the HVDC transmission line route in the summer of 2014 (see "Additional Desktop/Field Analyses" below). The identification of potential gray bat caves in the Action Area is limited to the results of this field effort and existing, publicly available data.

Presence in the Action Area Based on Existing Data

Gray bats are known to or are believed to occur in the following counties proposed to be traversed by the Project: (Oklahoma) Muskogee, Sequoyah; (Arkansas) Cleburne, Crawford, Franklin, Jackson, Johnson, Pope, Van Buren, and White (see Figure 5.21-1, "Potential Presence of Gray Bat in the Action

Area") (USFWS 2014b). Gray bats are not known hibernators in Oklahoma and occur during migration and summer (ODWC 2011). According to ODWC (2011), none of the nine colonies that summer in caves occur in Project counties; however, some maternity colonies do occur in adjacent counties (Cherokee and Adair Counties). The locations of summer colonies in Oklahoma are confidential and not publicly available.

There are five hibernacula and 20 summer caves in Arkansas (Harvey, Redman, and Chaney 2005; Martin 2007). Several additional caves are used by transient gray bats. Only two caves occur in counties traversed by the Project (Martin 2007). Lands End Cave is used by transient bats in Pope County, and Shirley Bat Cave is a bachelor cave in Van Buren County. The exact locations of these caves are confidential. Many of the known gray bat caves occur in the counties adjacent (to the north) to those traversed by the Project, including Madison, Newton, Searcy, Stone, Independence, and Lawrence.

Clean Line reviewed publically available land cover, hydrology, and wetland data to evaluate the availability of gray bat foraging habitat in the Action Area (ESRI 2010; USFWS 2012b; USGS 2012). Gray bats typically forage near the surface of open water (Tuttle 1976; USFWS 2009). For the purposes of the data review, perennial streams and waterbodies, as well as wetlands over one acre, were considered suitable open water habitats over which gray bats could forage. Table 5.21-1, "Potential Gray Bat Foraging Habitat Available in the Action Area," lists the potentially suitable habitat available to gray bats in the Action Area. Perennial stream habitats are listed by total length in each county, while wetlands and other open waterbodies are listed by total acres in each county. Potential foraging habitat, according to Table 5.21-1, "Potential Gray Bat Foraging Habitat Available in the Action Area," is available in all counties in the Action Area although the extent to which its available varies greatly between counties.

Table 5.21-1
Potential Gray Bat Foraging Habitat Available in the Action Area

Location	Perennial Streams (miles)	Perennial Waterbodies (acres)	Wetlands (acres)
Arkansas			
Cleburne	32.4	31.8	
Crawford	72.1	2191.4	567.8
Franklin	45.4	1051.3	
Jackson	63.9	2304.2	5001.0
Johnson	51.0	480.00	
Pope	44.3	291.4	
Van Buren	22.2	7.8	
White	67.8	302.0	879.8
Oklahoma			
Muskogee	257.2	3704.9	5811.1
Sequoyah	109.7	1326.9	1789.3
Total	765.9	11691.6	14048.9

Sources: ESRI (2010); USFWS (2012b); USGS (2012)

Additional Desktop/Field Analyses

During summer and fall of 2014, Clean Line conducted surveys for subterranean features (i.e., caves, sinkholes, rock shelters, and other karst features) that may be used by threatened or endangered bats, including gray bats, as roosts and hibernacula. The surveys were conducted along a 300-foot wide survey corridor centered on the HVDC transmission line route. In summary, 30 features were recorded within the gray bat range, of which seven provide suitable conditions to support hibernating bats or maternity colonies while six were determined to provide possible temporary bat roosting habitat. The seven potentially suitable hibernacula or maternity colony sites were all located in close proximity to each other in White County, Arkansas. The six potential temporary roosts included a cluster of three features in Crawford County, Arkansas [redacted], a cluster of two in Franklin County, Arkansas, and a single feature in Cleburne County, Arkansas. Approximately 41 percent of the total Project study area was surveyed within the gray bats known range, as a lack of landowner permissions restricted access to remaining areas. Refer to the "Bat Habitat Assessment of the Clean Line Plains & Eastern Transmission Line Project, Oklahoma, Arkansas, and Tennessee" in Appendix D and the "Re-Evaluation of Select Karst Features along the Plains & Eastern Clean Line Transmission Line Project, Oklahoma, Arkansas, and Tennessee" in Appendix E for full details on these survey efforts.

5.21.5 Direct and Indirect Impacts

Direct Mortality/Injury

Construction activities could directly cause mortality or injury to gray bats if drilling or blasting occurs in close proximity to occupied hibernacula, maternity colonies, or other roosts in caves or mines. There were seven karst features with conditions suitable for hibernating bats or maternity colonies and six features that may provide potential temporary bat roosts. However, since approximately 59 percent of the Project survey area in gray bat range was not surveyed for subterranean features due to land access constraints, it is possible that additional maternity roosts, hibernacula, and other roosts occur in these unsurveyed areas (see Appendix D). To avoid impacts on gray bat maternity caves, hibernacula, and other roosts, Clean Line will avoid and/or minimize construction within 300 feet of caves known to be occupied by gray bats (see FVW-6 in Section 5.21.6.1, "Environmental Protection Measures") and will coordinate with the USFWS on seasonal or spatial restrictions to avoid or minimize potential impacts to sensitive areas during O&M. Clean Line will identify any potential gray bat caves or roosts in the currently unsurveyed areas of the Project prior to construction, as landowner access is obtained, and apply the same measures to any newly identified caves.

Mortalities and/or illness could also directly result from herbicide use for weed control, as well as fuel or other chemical spills, if any bat that comes in direct contact with the spill. Similarly, spills could cause mortality or illness indirectly if water or prey are contaminated. However, Clean Line would keep emergency and spill response equipment available during all Project activities, so that in the unlikely event that spills occur, they would be promptly contained, thus reducing potential adverse effects on gray bats ((GE-13)See Section 5.21.6.1, "Environmental Protection Measures").

Sensory Disturbance

Gray bats could be disturbed by Project-related noise and vibrations during construction, operations, and decommissioning, if activities occur in close proximity to occupied maternity colonies, hibernacula, or other roosts. A literature review did not identify noise volume or distance thresholds at which bats would be disturbed. Disturbance of hibernacula could cause bats to arouse and increase their metabolism, thus resulting in loss of energy reserves and decreasing survival. Maternity colonies may be susceptible to sensory disturbances from Project activities during summer months. Any disturbances to these colonies could negatively impact the health and survival of pups. Seven karst features with conditions appropriate to support potential hibernacula and maternity colonies were identified during

Text Omitted from Page 174

DISCLAIMER: Upon consultation with the U.S. Fish and Wildlife Service, redactions have been made to the publicly released document to remove information related to potential species habitats and occurence in order to protect sensitive species from disturbance.

field surveys in White County, Arkansas. In addition, the six potential temporary bat roosts recorded in Cleburne, Crawford, and Franklin Counties, Arkansas would be susceptible to sensory disturbance if occupied (see Appendix D and Appendix E). Furthermore, maternity colonies, hibernacula, and other roosts may be present in the remaining unsurveyed areas of the Project survey area in the gray bat's range. Clean Line will avoid and/or minimize construction within 300 feet of caves known to be occupied by gray bats to reduce sensory disturbance impacts on the species and will coordinate with the USFWS on seasonal or spatial restrictions to avoid or minimize potential sensory disturbance during O&M (see FVW-6 and FVW-5 in Section 5.23.6.1, "Environmental Protection Measures"). Clean Line will identify any potential gray bat caves or roosts in the currently unsurveyed areas of the Project prior to construction, as landowner access is obtained, and apply the same measures to any newly identified caves.

Research has indicated that bats may be more likely to avoid foraging in areas with intense, broadband background noise, such as traffic (Schaub, Ostwald, and Siemers 2008). As such, Project-related noise may degrade foraging habitats temporarily when Project activities occur in proximity. Potential gray bat foraging habitat is available in all counties in the Action Area to varying degrees (Table 5.21-1, "Potential Gray Bat Foraging Habitat Available in the Action Area"). Clean Line will restrict Project activities to daylight hours (see GE-20 in Section 5.21.6.1 "Environmental Protection Measures"), which would largely avoid Project-related noise impacts on foraging bats in the Action Area. Sensory disturbance impacts on gray bats as a whole would be short term, lasting only as long as Project crews and equipment were in a given area.

Habitat Loss/Alteration

Gray bats may be indirectly impacted by fragmentation and removal of riparian forests and wetland complexes during grading, clearing, and excavating activities. There are nearly 766 miles of perennial streams and 11,700 acres of other perennial waterbodies in the Action Area (Table 5.21-1, "Potential Gray Bat Foraging Habitat Available in the Action Area"). Similarly, there are more than 14,000 acres of wetlands in the Action Area. Any removal or alteration of these potential foraging areas by the Project may result in reduction of the quality of the habitat and available prey at the impacted locations. Potential impacts on foraging habitat are expected to be long term or permanent for riparian woodlands or forested wetland complexes as they would require more than five years to be restored to pre-construction conditions or would not be restored at all. Impacts on non-forested wetland complexes may require less than five years to restore to pre-construction conditions, and would be considered short-term impacts.

Several additional Project-related factors could result in habitat alteration and/or loss. Sensory disturbance associated with the increased presence of personnel and equipment during construction and decommissioning could cause gray bats to flee or avoid caves in areas of temporary Project activity. This would effectively amount to temporary habitat loss, although the associated impacts would be short term and would end when Project activities ceased. These impacts may also be permanent, if gray bats abandon occupied caves. Any sensory disturbance occurring during typical O&M activities, such as vegetation management within the ROW would be minimal, with activities only occurring for a short time, and is not expected to result in habitat loss. Clean Line would avoid and/or minimize construction within 300 feet of occupied gray bat caves and will coordinate with the USFWS on seasonal or spatial restrictions to avoid or minimize potential impacts to sensitive areas during O&M (see FVW-6 and FVW-5 in Section 5.21.6.1, "Environmental Protection Measures").

Spills and sediment from Project sources could negatively impact the invertebrates on which gray bats may feed. In addition, in the unlikely event that a fire associated with construction equipment and personnel occurs, it could result in foraging habitat loss or alteration. The effects of spills and fires on habitat would result in indirect impacts on gray bats and would typically be long-term impacts or permanent in riparian areas, as forests/woodlands would require more than five years to be restored to pre-construction conditions or would not be restored at all. Environmental protection measures such as GE-1, GE-13, and GE-14 (see Section 5.21.6.1, "Environmental Protection Measures") will minimize the likelihood of fires and spills impacting gray bats by training personnel to prevent these incidents and putting procedures in place to minimize impacts on environmental resources (e.g., gray bats) in the unlikely event that an incident occurs.

Increased Predation

Predators may also increase due to factors such as habitat alteration and trash. Trash created by Project personnel can attract known predators like domestic cats (*Felis silvestris*) (Harriman 2003). Predation associated with Project activities is expected to have a negligible impact on gray bats, as all trash would be properly disposed of in a timely manner during all phases of the Project (see Section 5.21.6.1, "Environmental Protection Measures"); therefore, predation is not considered a notable threat to the species.

5.21.6 Protection Measures

Clean Line has agreed to a number of measures to avoid or minimize impacts on gray bats. These measures include the Clean Line-designated EPMs outlined in Section 2.5, "Environmental Protection Measures," and species-specific measures. Collectively, the EPMs and species-specific measures are referred to as "Protection Measures."

5.21.6.1 Environmental Protection Measures

The following EPMs—general (GE); fish, vegetation, and wildlife (FVW); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on gray bats:

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety, and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits.
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies, and groundwater wells, or as otherwise required by federal, state, or local regulations.
- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.

- (GE-20) – Clean Line will conduct construction and scheduled maintenance activities on the facilities during daylight hours, except in rare circumstances that may include, for example, to address emergency or unsafe situations, to avoid adverse environmental effects, to minimize traffic disruptions, or to comply with regulatory or permit requirements.
- (GE-21) – Clean Line will maintain construction equipment in good working order. Equipment and vehicles that show excessive emissions of exhaust gasses and particulates due to poor engine adjustments or other inefficient operating conditions will be repaired or adjusted.
- (GE-22) – Clean Line will impose speed limits during construction for access roads (e.g., to reduce dust emissions, for safety reasons, and for protection of wildlife).
- (GE-25) – Clean Line will turn off idling equipment when not in use.

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.
- (FVW-6) – Clean Line will avoid and/or minimize construction within 300 feet of caves known to be occupied by threatened or endangered species.

Waters, Wetlands, and Floodplains EPMs:

- (W-3) – Clean Line will establish streamside management zones within 50 feet of both sides of intermittent and perennial streams and along margins of bodies of open water where removal of low-lying vegetation is minimized.
- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.

5.21.6.2 Species-specific Measures

Clean Line has developed EPMs to avoid or minimize disturbances to caves occupied by ESA-listed species (e.g., gray bats; see FVW-6 in Section 5.21.6.1, “Environmental Protection Measures”) during construction of the Project. Furthermore, Clean Line has committed to minimizing impacts on environmentally sensitive vegetation (FVW-1) and reducing construction and O&M-related impacts during important time periods like maternity or hibernation (FVW-5). To Clean Line’s knowledge, there are no established species-specific measures for the gray bat; however, measures to be implemented by Clean Line to avoid or minimize impacts on other ESA-listed bat species (e.g., Indiana bats) will also benefit gray bats. As such, Clean Line proposes to rely on their EPMs and their commitment to species-specific measures for other bat species to minimize potential Project impacts on gray bats.

5.21.7 Effects Determination

Potential gray bat foraging habitat is common throughout the Action Area (see Table 5.21-1, "Potential Gray Bat Foraging Habitat Available in the Action Area") and would be subject to impacts where Project activities occur in and adjacent to these areas. Clean Line has committed to avoiding or minimizing impacts on environmentally sensitive vegetation and limiting the removal of vegetation along the margins of bodies of open water (see FVW-1 and W-3 in Section 5.21.6.2 "Environmental Protection Measures"). These measures would reduce the potential for loss or alteration of gray bat foraging habitat. Similarly, Clean Line will limit Project activities to daylight hours (GE-20), which would reduce the likelihood that noise would diminish the quality of foraging habitats for bats as they forage at night. Clean Line will also selectively apply herbicides in streamside management zones (W-4) and restrict refueling near wetlands and waterbodies (GE-14) to minimize potential impacts on foraging habitats and gray bat prey. Finally, the EPMs detailed in Section 5.21.6, "Protection Measures," indicate that Clean Line will practice good housekeeping to prevent attracting predators or causing fires.

The greatest threats to gray bats are largely associated with impacts on occupied hibernacula and maternity roosts (see Section 5.21.3 "Current Threats"). Clean Line's 2014 bat habitat assessment field surveys revealed seven subterranean features that could potentially support gray bat hibernation or maternity roosts along a 300-foot study corridor centered on the Project's HVDC transmission line in White County, Arkansas (see Section 5.21.4 "Potential Presence in the Action Area"). However, approximately 59 percent of the study corridor was not surveyed due to access restrictions. Clean Line may identify additional potential gray bat caves in unsurveyed areas prior to construction, as land access is granted. Clean Line is committed to avoiding or minimizing construction within 300 feet of occupied caves and will coordinate with the USFWS on seasonal or spatial restrictions to avoid or minimize potential impacts to sensitive areas during O&M, but with seven potential hibernacula/maternity roosts in the surveyed area and the potential for additional caves or roosts to occur in the remaining unsurveyed areas, the Project may not be able to completely avoid all disturbance to gray bats.

The potential unavoidable impacts on gray bats through disturbances of cave hibernacula, maternity colonies, and other roosts are not discountable or insignificant, even though Clean Line will avoid and/or minimize construction within 300 feet of occupied caves (see FVW-6 in Section 5.21.6.1, "Environmental Protection Measures"). Clean Line will conduct pre-construction surveys to determine the presence or likely absence of gray bats in known and potentially suitable caves; however, this information will not be available for most of the survey area prior to the completion of the BA, so for purposes of this consultation, Clean Line is assuming that the seven documented potential caves or any potential caves in unsurveyed areas may be occupied. For these reasons, the Project "may affect, and is likely to adversely affect" the gray bat.

Critical habitat has not been designated for the gray bat; therefore, the Project "will not destroy or adversely modify" critical habitat for the species.

5.21.8 Cumulative Effects

The cumulative effects of non-Project-related future activities on gray bats are described below. This discussion is necessitated by the fact that gray bats are likely to be adversely affected by the Project. This section considers future state, local, tribal, and private actions, not involving federal activities, that are reasonably certain to occur within the gray bat Action Area.

The following activities have been identified as reasonably certain to occur within the gray bat Action Area:

- ***US-62, Northwest Corner of Muskogee County, Oklahoma.*** ODOT (2013) plans a bridge and approaches activity on US-62 at Cane Creek about 1.3 miles south of where US-62 joins SH-72 and turns south. The Project disturbance footprint would traverse US-62 about 0.1 miles north of this activity. This activity may result in some vegetation clearing/maintenance, but potential impacts on gray bats in the Action Area would largely be associated with temporary disturbances from crews and equipment during construction.
- ***SH-10A in Muskogee and Sequoyah Counties, Oklahoma.*** ODOT (2013) plans to grade, drain, and surface the stretch of SH-10A that runs between SH-10 and SH-100. At the closest point, the Project disturbance footprint lies about 1.7 miles southwest of this planned activity. This activity may result in potential impacts on gray bats associated with temporary disturbances from crews and equipment in the Action Area during construction.
- ***I-40 near its Junction with SH-82, Sequoyah County, Oklahoma.*** ODOT (2013) plans two activities along this section of I-40, including a bridge and approach activity over Vian and Little Vian Creeks, and 6 miles of pavement rehabilitation. At the closest point, the Project disturbance footprint lies about 1.5 miles northeast of this section of I-40. These activities may result in some vegetation clearing/maintenance, but potential impacts on gray bats in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.
- ***US-64 West of Sallisaw, Sequoyah County, Oklahoma.*** ODOT (2013) plans bridge and approaches activity at Big Sallisaw Creek. The location is about 2.4 miles south of the Project disturbance footprint. This activity may result in some vegetation clearing/maintenance, but potential impacts on gray bats in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.
- ***SH-101 East of Sallisaw, Sequoyah County, Oklahoma.*** ODOT (2013) plans bridge and approaches activity at an unnamed creek that is about 0.6 miles north of the Project disturbance footprint. This activity may result in some vegetation clearing/maintenance, but potential impacts on gray bats in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.
- ***AHTD District 4, Crawford County, Arkansas.*** The AHTD (2012, 2014a) has plans for programmed work on I-40 from the Oklahoma-Arkansas state line to an area west of Dyer, and has plans for new construction of US-71 from Alma south to an area east of Kibler, and to the Arkansas River southeast of Fort Smith. The Project disturbance footprint would traverse the both of these activity segments. The new construction activities may require in some vegetation clearing/maintenance, which may result in impacts on gray bats and suitable habitat. Similarly, potential impacts on gray in the Action Area may also occur during construction for the I-40 work and new construction and would largely be associated with temporary disturbances from crews and equipment.

- ***AHTD District 8, Pope County, Arkansas.*** The AHTD (2014b) has plans for programmed road work on a short segment of SH-27 about 2.4 miles to the north of the Project disturbance footprint. Potential impacts on gray bats in the Action Area may occur during construction for the SH-27 work and would largely be associated with temporary disturbances from crews and equipment.
- ***AHTD District 8, Van Buren County, Arkansas.*** The AHTD (2014b) has plans for programmed road work on US-65 from Bee Branch to about 3 miles south. At the closest point, the Project disturbance footprint lies about 1.7 miles to the south of the road work's southern end. This activity may result in some vegetation clearing/maintenance, but potential impacts on gray bats in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.
- ***AHTD District 5, Jackson County, Arkansas.*** The AHTD (2014c) has plans for programmed road work on US-167 in the small segment of the road going through the western edge of the county. The Project disturbance footprint would traverse this road segment. This activity may result in some vegetation clearing/maintenance, but potential impacts on gray bats in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.

5.22 Indiana Bat

The Indiana bat (*Myotis sodalis*) was initially listed as endangered under the Endangered Species Preservation Act of 1966, which was superseded by the Endangered Species Act of 1973 (USFWS 1967; USFWS 2013a). Critical habitat was designated for Indiana bats in 13 locations across six states effective October 22, 1976 (USFWS 1976). The following caves are federally listed as critical habitat:

- Illinois – Blackball Mine (LaSalle County);
- Indiana – Big Wyandotte Cave (Crawford County), Ray's Cave (Greene County);
- Kentucky – Bat Cave (Carter County), Coach Cave (Edmonson County);
- Missouri – Cave 021 (Crawford County), Caves 009 and 017 (Franklin County), Pilot Knob Mine (Iron County), Bat Cave (Shannon County), Cave 029 (Washington County);
- Tennessee – White Oak Blowhole Cave (Blount County); and
- West Virginia – Hellhole Cave (Pendleton County).

The nearest critical habitat to the Project is located in Shannon County, Missouri, which is approximately 115 miles north of the Proposed Route as it crosses Jackson County, Arkansas.

5.22.1 Natural History

Range

Indiana bats are endemic to the eastern and central United States. Their range spans from eastern Oklahoma, Missouri, Iowa, and Michigan to the west, and Vermont, Connecticut, New York, North Carolina, and Alabama to the east (Luensmann 2005; USFWS 2007; Burgess 2012; NatureServe 2013). Indiana bats migrate between summer roost sites and winter hibernacula. As of 2006, extant winter populations had been documented at 281 hibernacula in 19 states (see Table 5.22-1, "States with Extant Populations of Indiana Bats during the Summer and Winter") (USFWS 2007). The USFWS (2007) also had records of 269 maternity colonies in 16 states (see Table 5.22-1, "States with Extant Populations of Indiana Bats during the Summer and Winter"). Adult males are found throughout the species' range, but typically remain close to their hibernacula during the summer.

Table 5.22-1
States with Extant Populations of Indiana Bats during the Summer and Winter

Winter	Summer
Alabama, Arkansas, Connecticut, Illinois, Indiana, Kentucky, Maryland, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee, Vermont, Virginia, West Virginia	Arkansas, Illinois, Indiana, Iowa, Kentucky, Maryland, Michigan, Missouri, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, Tennessee, Vermont, Virginia, West Virginia

Source: USFWS 2007.

The summer and winter range of the Indiana bat includes extreme eastern Oklahoma, northern Arkansas, and throughout Tennessee. Table 5.22-2, "Oklahoma, Arkansas, and Tennessee Counties with Indiana Bat Summer and Winter Records," lists the Oklahoma, Arkansas, and Tennessee counties that have records of summer and winter ranges for the Indiana bat (USFWS 2007). Section 5.22.4, "Potential Presence in the Action Area," describes the Indiana bat's range relative to the Project in more detail.

Table 5.22-2
Oklahoma, Arkansas, and Tennessee Counties with Indiana Bat Summer and Winter Records

Counties	Summer	Winter
Oklahoma		
Delaware	X	
Adair	X	X
Sequoyah	X	
Le Flore		X
Pushmataha	X	X
Arkansas		
Benton	X	X
Washington	X	X
Franklin		X
Madison	X	X
Baxter		X
Newton	X	X
Searcy	X	X
Marion	X	X
Stone	X	X
Independence	X	X
Craighead	X	
Clay	X	
Tennessee		
Shelby	X	
Stewart	X	X
Montgomery		X
Perry		X
Hickman	X	

Table 5.22-2
Oklahoma, Arkansas, and Tennessee Counties with Indiana Bat Summer and Winter Records

Counties	Summer	Winter
Maury	X	
Lincoln	X	
Franklin	X	
Bedford		X
Marion		X
Warren		X
White		X
Van Buren		X
Fentress		X
Campbell		X
Claiborne	X	
Grainger		X
Hawkins		X
Sevier	X	
Blount	X	X
Monroe	X	

Source: USFWS 2007.

Feeding

Indiana bats are nocturnal insectivores and feed almost exclusively on flying insects (USFWS 2007). They emerge from their roosts after dusk, typically within two hours, but there may be considerable variation in emergence times. Indiana bats prefer to forage in areas around water sources (rivers, streams, ponds) or open woodlands, but they may also be found foraging in open areas (USFWS 2007; Boyles, Timpone, and Robbins 2009). Individual bats may forage up to approximately 5 miles from their roosts, but most foraging areas are much closer (USFWS 2007).

Spring and Summer Ecology

Most Indiana bats emerge from their hibernacula between late March and mid-May, depending on latitude and weather (USFWS 2007). Females often emerge earlier than do males (Luensmann 2005; USFWS 2007). Female Indiana bats migrate to their summer habitats upon emergence, while males tend to remain near their hibernacula through the summer (USFWS 2007). Some males do, however, migrate long distances. Spring migrations can be risky, as food sources, if insufficient, cause bats to deplete fat reserves. This may explain why males do not often undertake long migrations. Females typically migrate quickly and may cover distances of tens or hundreds of miles in just one or a few nights. The longest recorded migration of Indiana bats was 357 miles (Winhold and Kurta 2006; USFWS 2007). Still, other females hibernate close to their summer habitat.

The USFWS (2014a) stated that suitable summer habitat for Indiana bats consists of a variety of forested and woodland habitats used for roosting, foraging, and traveling. These habitats may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields, and pastures. Indiana bats use forests and woodlots containing potential roosts (i.e., live trees and/or snags that are typically greater than 5 inches in diameter at breast height that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. Suitable woodlands may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet of other forested or woodland habitat.

Maternity colony formation occurs in May and early June (USFWS 2007). Maternity colonies are largely composed of reproductive females, but adult males and nonbreeding females have been documented at these roosts. Colonies typically contain between 60 and 80 bats, but as many as 384 bats have been reported emerging from a maternity roost tree (USFWS 2007; Boyles, Timpone, and Robbins 2009). Indiana bats will use sloughing bark of dead trees or tree cavities for maternity colonies and summer roosts. Common tree species used for roosting include ash (*Fraxinus* sp.), elm (*Ulmus* sp.), hickory (*Carya* sp.), maple (*Acer* sp.), poplar (*Populus* sp.), and oak (*Quercus* sp.). Project area forests that support Indiana bats are typically dominated by oak-hickory complexes, which may include smaller portions of ash, elm, maple, and popular trees. Ash, elm, maple, and poplar trees can also be dominant locally in eastern Oklahoma, northern Arkansas, and southwestern Tennessee. Roost trees are usually larger than the surrounding forest trees and are located on forest edges and open areas (Boyles, Timpone, and Robbins 2009). Indiana bats will use both primary and alternate roost trees. A majority of bats use primary roost trees for some or all of the summer. Alternate roost trees are intermittently used throughout the summer. Primary roosts are typically in open sites (versus forest interiors); however, statistical differences were not observed between the physical characteristic of trees (height, canopy cover, solar exposure, or amount of bark) (USFWS 2007). Male Indiana bats may form smaller bachelor groups or remain solitary during the summer.

Females give birth to a single pup in June or early July (Kurta and Rice 2002; USFWS 2007; Burgess 2012). Births in a maternity colony may be asynchronous, potentially occurring over more than two weeks (USFWS 2007). Pups are nursed for three to five weeks until they become volant, i.e., are able to fly (USFWS 2007; Burgess 2012). The earliest born pups may be volant by the first week of July. Maternity colonies begin to disperse as young become volant (USFWS 2007). Use of primary maternity roosts tends to decrease, as females generally become less social and begin to use more alternative roosts.

Fall and Winter Ecology

Indiana bats begin arriving at hibernacula as early as late July (USFWS 2007). Many of the earliest arrivals are adult males and non-reproductive females. Maternity colonies typically begin disbanding in the first half of August, but the last few Indiana bats may not begin the fall migration until late September or early October, particularly in northern areas (USFWS 2007). Late migrants are more likely young-of-the-year bats (Kurta and Rice 2002; USFWS 2007). Indiana bats from the same maternity colony do not necessarily migrate to the same hibernacula. Migration distances from hibernacula can range from less than 10 miles to more than 300 miles; however, males tend to migrate shorter distances (USFWS 2007).

Upon arrival at hibernacula, Indiana bats begin to "swarm," which consists of large numbers of bats flying in and out of caves from dusk to dawn (USFWS 2007). Very few Indiana bats roost in the caves during the day. Male Indiana bats typically roost in trees during the day and return to hibernacula at night. Swarming continues over several weeks. Indiana bat activity at hibernacula peaks in September and early October, and males may remain active until mid-October and beyond. Males may stay active longer to mate with females as they arrive at hibernacula. Indiana bats mate in the latter part of the swarming period. Females store sperm throughout the winter and delay fertilization until after spring emergence. During fall swarming, Indiana bats also forage extensively in the vicinity of the hibernacula to replenish fat reserves depleted during the fall migration. Fat stores are needed to support metabolic processes until the spring.

Indiana bats in their southern range, including Oklahoma, Arkansas, and Tennessee, typically enter hibernation by the end of November but may enter earlier in northern areas of their range (USFWS 2007). Various areas of eastern Oklahoma, northern Arkansas, and Tennessee have summer and/or wintering populations of Indiana bats (see Table 5.22-2, "Oklahoma, Arkansas, and Tennessee Counties with Indiana Bat Summer and Winter Records") (USFWS 2007). Populations of hibernating bats may increase through the fall and into early January at some locations. They often hibernate in large, dense clusters of 300 to 500 bats per square foot; however, small clusters and single-bat hibernations do occur. Indiana bats commonly share hibernacula with other bat species and are sometimes clustered with or adjacent to other bats, including, but not limited to, gray bats (*Myotis grisescens*) and northern long-eared bats (*Myotis septentrionalis*). Indiana bats arouse naturally during hibernation and sometimes move about, particularly during the latter stages of hibernation when they may move closer to the hibernaculum entrance. Arousal occurs once every 12 to 15 days on average, but can be increased by disturbances and environmental factors (USFWS 2007).

Hibernating Indiana bats typically use natural caves located in karst areas; however, the species also will use human-made structures, such as abandoned mines (USFWS 2007). The species exhibits site fidelity, as many Indiana bats, especially females, return to the same hibernacula annually. Indiana bats prefer hibernacula in which the ambient internal temperatures are stable relative to variable external temperatures (Tuttle and Kennedy 2002; USFWS 2007). Ambient temperatures should also remain below 50 degrees Fahrenheit (°F) but infrequently drop below freezing. Tuttle and Kennedy (2002) found that populations hibernating at ambient temperatures between 37.4°F and 45°F remained stable or increased, while those hibernating at temperatures above or below were unstable or declined (USFWS 2007). Brack, Johnson, and Stihler (2005) reported that temperatures below 41°F were too cold, and hibernacula with the highest concentrations of Indiana bats occurred in sites where the mid-winter temperatures were approximately 42.8°F to 44.6°F (USFWS 2007). Researchers studying ambient air temperatures at hibernacula have used a number of different techniques and equipment, making it difficult to compare results.

5.22.2 Population Status

Prior to the release of the original Indiana bat recovery plan in 1983, winter surveys of the species at known hibernacula were limited (USFWS 2007). Since that time, standardized surveys have been implemented and range-wide Indiana bat populations have been estimated biennially (USFWS 2007, 2009). Population estimates prior to the 1980s are considered approximate, but overall the population declined by more than half from 1965 to 2001 (USFWS 2007). The Indiana bat populations increased by approximately 40% between 2001 and 2007, when 590,875 bats were estimated (USFWS 2009, 2013b). Range-wide estimates from 2009 to 2013 revealed a mixed trend of rises and declines (USFWS 2013b). Populations have declined in some years during this period due to white-nose syndrome (WNS) (see Section 5.22.3, "Current Threats"). Indiana bat population numbers decreased by approximately 11% in

2009 largely due to WNS (USFWS 2013b). The most recent (2013) range-wide estimate of Indiana bat abundance is 534,239 individuals, a decline of 3.3% from 2011 (USFWS 2013b).

Arkansas populations of the Indiana bat have been in decline from 1965 to 2013 (USFWS 2007, 2012, 2013b). Indiana bats in Arkansas declined from an estimated 2,067 bats in 2005 to 856 in 2013 (USFWS 2013b). Tennessee populations of Indiana bats exhibited an overall increase in abundance from 2005 to 2013 from 12,074 to 15,537 bats. Indiana bats are rare in Oklahoma. Population estimates ranged from 0 (2007 and 2009) to 13 individuals (2011) since 2001. The most recent population estimate (2013) for the state was five bats.

5.22.3 Current Threats

Historically, the primary threat to Indiana bats has been destruction or degradation of summer habitat (i.e., forests) and winter hibernacula (USFWS 2007, 2009). Agricultural conversion was the greatest contributor to the loss of forests in the species' range after European settlement; however, agricultural conversion has slowed and some of these habitats have been allowed to revert to forests in recent decades. Currently, urbanization, (residential development), and associated infrastructure development (roads, pipelines, transmission lines) are the greatest contributors to the conversion of forests in the Indiana bat's range (USFWS 2007; Wear and Greis 2002). Indiana bats are known to use forest-agriculture transition areas for foraging, but may avoid highly developed areas (USFWS 2007). Anthropogenic modifications of bat hibernacula (e.g., caves and mines) have resulted in changes in thermal regimes, which have rendered caves unsuitable for hibernating bats. Cave modifications have occurred for a number of reasons, including tourism, installation of doors or gates to control access, and mining.

Disturbance of Indiana bat hibernacula poses a substantial threat to the species (USFWS 2007). Overuse of hibernacula for commercial, recreational, scientific, and educational purposes have contributed to physical disturbances of hibernating bats, which may render caves unsuitable. Indiana bats are particularly vulnerable to loss of hibernacula because the species typically occurs in great numbers at a relatively few locations. Furthermore, disturbances of hibernating bats affect survival and reproduction, as bats are likely to arouse and expend valuable energy stores. Direct mortality by vandals has been a problem historically and has remained a threat in recent years despite regulatory protections and management efforts. Disturbance impacts on Indiana bats in the summer have been recorded; however, there are substantially fewer documented occurrences of summer disturbance than there are at hibernacula.

The USFWS considers the current primary threat to Indiana bats to be WNS. White-nose syndrome, a fungal infection caused by *Geomyces destructans*, has recently contributed the deaths of millions of bats in North America, including Indiana bats. Some bat hibernacula have shown decreases of 90% to 100% of bat populations (USFWS 2012). The infection has been documented in hibernacula in 25 states and five Canadian provinces (USFWS 2013c; USGS 2014). The fungus that causes WNS was recently detected in two caves in Arkansas (Sasse 2013; USFWS 2013d). To date, two bat deaths attributed to WNS have been documented in Arkansas (USFWS 2014b). Hibernacula in northern and western Tennessee have been confirmed to be infected by the disease (USFWS 2012). Currently, Oklahoma is considered a WNS suspect state due to a bat from western Oklahoma that tested positive for the fungus that causes WNS in 2010, but additional surveillance efforts since that time have not detected the fungus or disease (USFWS 2013d).

Collisions with human-made objects are a growing concern, particularly mortalities associated with wind turbine collisions (USFWS 2007). Barotrauma, or rapid decompression, may also cause mortalities in bats at wind turbines. Barotrauma occurs when bats fly near the outer portions or tips of rapidly moving turbine blades, which cause a rapid change in air pressure (Strickland et al. 2011). The air pressure difference causes the bat's lungs to expand rapidly, which results in small blood vessels breaking open and internal bleeding (Baerwald et al. 2008). Barotrauma does not appear to be an important source of bat mortality at wind farms, as originally hypothesized by Baerwald et al. (AWWI 2014). The first known Indiana bat mortality at a wind farm was documented in September 2009. From September 2009 through the summer of 2013, four more mortalities were documented (Pruitt and Okajima 2013).

Several additional factors may pose threats to Indiana bat populations. Natural catastrophes (e.g., flooding, freezing) and predation are documented causes of Indiana bat mortality, particularly at winter hibernacula (USFWS 2007, 2009). Environmental contaminants may also cause mortality, reduced fitness and survival, and lower reproduction (USFWS 2007). Intraspecific competition and climate change also are potential threats to the species. The potential threats mentioned in this paragraph are either not considered a major threat to the continued existence of the species or remain poorly understood.

5.22.4 Potential Presence in the Action Area

Definition of the Action Area

The Indiana bat Action Area has been defined as the project disturbance footprint plus a 2.5-mile buffer where potentially suitable foraging habitat, maternity colonies, hibernacula, or other roosts are traversed by the Project within the Indiana bat's known range. The 2.5-mile buffer from the project footprint encompasses potential direct and indirect impacts on Indiana bats, or their habitats, where their winter and/or summer ranges overlap the project disturbance footprint. Indiana bats typically forage 2.5 miles or less from their summer roost trees (USFWS 2007). This Action Area will be inclusive of all hibernacula, roosts, and foraging habitat that occurs within the typical foraging distance of summer roosting Indiana bats. The Project surveyed for potential karst/cave features and roost trees within a 300-foot corridor along the HVDC transmission line route in the summer of 2014 (see "Additional Desktop/Field Analyses" below). The identification of potential Indiana bat caves and roost trees in the Action Area is limited to the results of this field effort and existing, publicly available data.

Presence in the Action Area Based on Existing Data

The Indiana bat is known or believed to occur in the following counties proposed to be traversed by the Project: (Oklahoma) Sequoyah; (Arkansas) Cleburne, Crawford, Franklin, Jackson, Johnson, Pope, and Van Buren; (Tennessee) Shelby and Tipton (see Figure 5.22-1, "Potential Presence of Indiana Bat in the Action Area") (USFWS 2013e, 2014c). There is a documented cave supporting hibernating Indiana bats in Franklin County, Arkansas (USFWS 2007). Additionally, Foushee Cave Natural Area, which is approximately 20 miles north of the Project, in Independence County, Arkansas, has been identified as important habitat for multiple karst-dependent species, including the Indiana bat (Arkansas Natural Heritage Commission [ANHC] 2013). The USFWS has identified the Ozark Plateau National Wildlife Refuge in Oklahoma as important to the Indiana bat (USFWS 2013f). The Project traverses the boundary of land that has been approved for acquisition as part of the refuge. Similarly, The Oklahoma Nature Conservancy (2013) has identified areas in the vicinity of the refuge as having potential bat caves. The specific locations of occupied caves are confidential.

Clean Line reviewed publically available land cover and hydrology data to evaluate the availability of Indiana bat foraging habitat in the Action Area (USGS 2012; Jin et al. 2013). Indiana bats typically forage in areas around water sources (rivers, streams, ponds) or open woodlands (USFWS 2007; Boyles, Timpone, and Robbins 2009). For the purposes of the data review, perennial streams and waterbodies, and forests, were considered suitable habitats in which Indiana bats could forage. Table 5.22-3, "Potential Indiana Bat Foraging Habitat Available in the Action Area," lists the potentially suitable habitat available to Indiana bats in the Action Area. The forested areas listed in the table may also give an indication of the availability summer roosting habitat in Action Area beyond the areas surveyed during the field effort (see "Additional Desktop/Field Analyses" below). Perennial stream habitats are listed by total length in each county, while other open waterbodies and forests are listed by total acres in each county. Potential foraging habitat, according to Table 5.22-3, "Potential Indiana Bat Foraging Habitat Available in the Action Area," is available in all counties in the Action Area although the extent to which its available varies greatly between counties.

Table 5.22-3
Potential Indiana Bat Foraging Habitat Available in the Action Area

Location	Perennial Streams (miles)	Perennial Waterbodies (acres)	Deciduous Forest (acres)	Evergreen Forest (acres)	Mixed Forest (acres)	All Forests (acres)
Arkansas						
Cleburne	31.7	330.8	14,977.9	6,106.7	4,794.4	25,879.0
Crawford	62.4	2111.4	17,027.2	5,587.6	2,825.7	25,440.5
Franklin	46.1	1247.0	6,575.4	14,302.5	3,992.7	24,870.5
Jackson	62.8	428.0	9,827.7	400.6	3,702.9	13,931.1
Johnson	50.7	645.7	19,903.4	23,085.9	5,434.1	48,423.4
Pope	44.0	418.1	23,323.2	26,681.0	5,637.8	55,641.9
Van Buren	21.0	255.0	7,679.9	2,563.7	1,675.0	11,918.6
Oklahoma						
Sequoyah	54.8	718.5	1,355.2	1,680.5	50,303.8	1,355.2
Tennessee						
Shelby	11.2	157.5	1,101.0	242.2	40.8	1,385.0
Tipton	20.6	281.8	6,378.1	164.5	70.6	6,613.1
Total	417.9	6,650.0	155609.7	80,876.4	30,012.8	266,498.8

Sources: USGS 2012; Jin et al. 2013.

Additional Desktop/Field Analyses

Clean Line conducted surveys for subterranean features (i.e., caves, sinkholes, rock shelters, and other karst features) and potential roost trees that may be used by threatened and endangered bats, including Indiana bats, during the summer and fall of 2014. The surveys were conducted along a 300-foot corridor centered on the HVDC transmission line route. Twenty-two subterranean features were recorded in the Indiana bat's range during these surveys, of which six were determined to provide possible temporary bat roosting habitat. There were no karst features deep or large enough to support Indiana bat hibernacula. The six potential temporary roost caves included a cluster of three features in Crawford County, Arkansas [redacted], a cluster of two in Franklin County, Arkansas, and one feature in Cleburne County, Arkansas. Approximately 35.5 percent of the total Project study area was surveyed within the Indiana bat's known range, as a lack of landowner permissions restricted access to remaining areas.

A total of 409 potential roost trees were documented during the summer 2014 field effort within the Indiana bat's known range. Table 5.22-4, "Number of Potential Indiana Bat Roost Trees in the Action Area by County," lists the number of potential roost trees recorded by county, and includes the average number of potential roost trees observed by mile. Refer to the "Bat Habitat Assessment of the Clean Line Plains & Eastern Transmission Line Project, Oklahoma, Arkansas, and Tennessee" in Appendix D and the "Re-Evaluation of Select Karst Features along the Plains & Eastern Clean Line Transmission Line Project, Oklahoma, Arkansas, and Tennessee" in Appendix E for full details on these survey efforts.

Table 5.22-4
Number of Potential Indiana Bat Roost Trees in the Action Area by County

County	Number of Potential Roost Trees	Average Potential Roost Trees per Mile
Sequoyah, OK	137	8.3
Crawford, AR	37	3.8
Franklin, AR	24	3.7
Johnson, AR	90	5.9
Pope, AR	41	3.9
Van Buren, AR	5	4.3
Cleburne, AR	43	5.1
Jackson, AR	26	7.6
Tipton, TN	2	0.3
Shelby, TN	4	1.8
Total	409	5.0

Source: Bat Habitat Assessment of the Clean Line Plains & Eastern Transmission Line Project, Oklahoma, Arkansas, and Tennessee (Appendix D).

5.22.5 Direct and Indirect Impacts

Direct Mortality/Injury

ROW clearing and maintenance activities, which would occur during construction and to a limited extent may be required during operations and maintenance of the project could directly cause mortality or injury to Indiana bats if occupied roost trees are cleared. Clean Line documented 409 potential roost trees within the 300-foot study corridor centered on the HVDC transmission line in the Indiana bat's known range (see Table 5.22-4, "Number of Potential Indiana Bat Roost Trees in the Action Area by County," and Appendix D). Since approximately 64.5 percent of the Project study corridor in the Indiana bat's range was not surveyed for potential roost trees due to land access constraints, it is possible that potential roosts occur in these unsurveyed areas. In total, there are about 266,000 acres of forests in the Action Area, much of which lies outside the study corridor, that may provide additional potential roost trees (see Table 5.22-4, "Number of Potential Indiana Bat Roost Trees in the Action Area by County"). Where summer roosting habitat is found to be occupied, Clean Line will clear trees outside of the summer resident season to avoid direct take of roosting Indiana bats (see Section 5.22.6.2, "Species-specific Measures"). Clean Line will also identify any potential Indiana bat roost trees in the currently unsurveyed areas of the 300-foot wide Project study corridor prior to construction, as landowner access is obtained, and apply the same measures to any newly identified roost trees.

The potential for mortalities and injuries also exists if drilling or blasting occurs in close proximity to occupied hibernacula. There were six karst features that may provide potential temporary bat roosts identified in Cleburne, Crawford, and Franklin Counties in Arkansas, but potential Indiana bat hibernacula were not identified during survey efforts (see Appendix D and Appendix E). Clean Line will avoid and/or minimize construction within 300 feet of caves known to be occupied by Indiana bats (FVW-6 in Section 5.22.6.1, "Environmental Protection Measures"), which would minimize these potential impacts, and will coordinate with the USFWS on seasonal or spatial restrictions to avoid or minimize potential impacts to sensitive areas during O&M. However, it is possible that potential hibernacula occur in these unsurveyed areas because approximately 64.5 percent of the Project survey area in the Indiana bat's range was not surveyed for subterranean features due to land access constraints. Clean Line will identify any potential Indiana bat caves in the currently unsurveyed areas of the 300-foot Project study corridor prior to construction, as landowner access is obtained, and apply the same measures to any newly identified caves.

Mortalities and/or injuries could also directly result from several other Project activities. Herbicide use for weed control, as well as fuel and other chemical spills, could cause mortality or illness in any bat that comes in direct contact with the spill. Similarly, spills could cause mortality or illness indirectly if water or prey are contaminated. However, Clean Line would keep emergency and spill response equipment available during all Project activities so that spills would be promptly contained, thus reducing potential adverse effects on Indiana bats (see GE-13 in Section 5.22.6.1, "Environmental Protection Measures"). Similarly, accidental fires caused by project personnel or equipment, depending on their severity, may cause direct mortality or injure bats if roost trees are burned. Keeping equipment in good working order (GE-21) and turning off idling equipment (GE-25) would reduce the possibility of igniting fires.

Sensory Disturbance

Indiana bats could be disturbed by Project-related noise and vibrations during construction, operations, and decommissioning, if these direct impacts occur in close proximity to occupied maternity colonies, summer roosts, or hibernacula. Disturbance of winter hibernacula could cause bats to arouse and increase their metabolism, thus resulting in loss of energy reserves and decreasing survival. Maternity colonies may be susceptible to sensory disturbances from Project activities during summer months. Any disturbances to these colonies could negatively impact the health and survival of pups. Potential hibernacula were not identified during field surveys. There were 409 potential roost trees identified in the 300-foot Project study corridor that may support maternity colonies. Still, hibernacula and potential roost trees may be present in the remaining unsurveyed areas of the Action Area. Clean Line will avoid and/or minimize construction within 300 feet of caves known to be occupied by Indiana bats to reduce sensory disturbance impacts on the species and will coordinate with the USFWS on seasonal or spatial restrictions to avoid or minimize potential impacts to sensitive areas during O&M (see FVW-6 and FVW-5 in Section 5.22.6.1, "Environmental Protection Measures"). Clean will also identify environmentally sensitive vegetation (e.g., roost trees) and minimize impacts, particularly during the maternity season (see FVW-1 and FVW-5 in Section 5.22.6.1, "Environmental Protection Measures"). Clean Line will identify any potential Indiana bat hibernacula or roost trees in the currently unsurveyed areas of the 300-foot Project survey corridor prior to construction, as landowner access is obtained, and apply the same measures to any newly identified features.

Research has indicated that bats may be more likely to avoid foraging in areas with intense, broadband background noise, such as traffic (Schaub, Ostwald, and Siemers 2008). As such, Project-related noise may degrade foraging habitats temporarily when Project activities occur in proximity. Potential Indiana bat foraging habitat is available in all counties in the Action Area to varying degrees (Table 5.22-4, "Number of Potential Indiana Bat Roost Trees in the Action Area by County"). Clean Line will restrict Project activities to daylight hours (see GE-20 in Section 5.22.6.1 "Environmental Protection Measures"), which would largely avoid Project-related noise impacts on foraging bats in the Action Area. Sensory disturbance impacts on Indiana bats would be short term, lasting only as long as Project crews and equipment were in a given area, although impacts have the potential for greater effects on local populations.

Habitat Loss/Alteration

Indiana bats may be indirectly impacted by fragmentation and removal of forest and woodland habitats during grading, clearing, and excavating activities. While Indiana bats typically roost near forest edges or openings, fragmentation does decrease connectivity between forest/woodland habitats. There are about 266,000 acres of forest in the Action Area (see Table 5.22-3, "Potential Indiana Bat Foraging Habitat Available in the Action Area"). There are also about 418 miles of perennial streams and approximately 6,650 acres of open waterbodies, which also potentially serve as Indiana bat foraging habitat. Any removal or alteration of these potential foraging areas by the Project may result in reduction of the quality of the habitat at the impacted locations. Potential impacts on roosting habitat are expected to be long term or permanent, as forests/woodlands would require more than five years to be restored to pre-construction conditions or would not be restored at all. Indiana bats also forage for insects near water sources. Alterations to aquatic habitats that alter prey availability or contaminate prey could have negative impacts on the species.

Several additional Project-related factors could result in habitat alteration and/or loss. Sensory disturbance associated with the increased presence of personnel and equipment during construction and decommissioning could cause Indiana bats to flee or avoid areas of temporary Project activity. This would effectively amount to temporary habitat loss, however, the associated impacts would be short term and end when Project activities ceased. Any sensory disturbance occurring during typical O&M activities, such as vegetation management within the ROW would be minimal, with activities only occurring for a short time, and is not expected to result in habitat loss. Spills and sediment from Project sources could also alter both aquatic and terrestrial habitats. In addition, fire associated with construction equipment and personnel could result in habitat loss or alteration. The effects of spills and fires would typically be short term; however, long-term impacts are possible, depending on the severity of the incident and response efforts. These impacts would be reduced by the implementation of environmental protection measures.

Spills and sediment from Project sources could negatively impact the invertebrates on which Indiana bats may feed. In addition, in the unlikely event that a fire associated with construction equipment and personnel occurs, it could result in foraging habitat loss or alteration. The effects of spills and fires on habitat would result in indirect impacts on Indiana bats and would typically be long-term impacts or permanent as forests/woodlands would require more than five years to be restored to pre-construction conditions or would not be restored at all. Environmental protection measures such as GE-1, GE-13, and GE-14 (see Section 5.22.6.1, "Environmental Protection Measures") will minimize the likelihood of fires and spills impacting Indiana bats by training personnel to prevent these incidents and putting procedures in place to minimize impacts on environmental resources (e.g., Indiana bats) in the unlikely event that an incident occurs.

Increased Predation

Predators may also increase due to factors such as habitat alteration and trash. Trash created by Project personnel can attract known Indiana bat predators like raccoons. This would be an indirect, short-term impact that would end with the removal of the trash source. Clean Line would practice good housekeeping to minimize the presence of trash from the Project during all phases of the Project (see Section 5.22.6.1, "Environmental Protection Measures"). A longer-term indirect impact would result from the creation of edge habitats, which also can attract predators. A number of common predators, including raccoons, are often classified as edge species (Masters et al. 2002). Habitat alteration can also facilitate movement and improve hunting efficiency for some predators.

5.22.6 Protection Measures

Clean Line has agreed to a number of measures to avoid or minimize impacts on Indiana bats. These measures include the Clean Line-designated EPMs outlined in Section 2.5, "Environmental Protection Measures," and species-specific conservation measures. Collectively, the EPMs and species-specific conservation measures are referred to as "protection measures."

5.22.6.1 Environmental Protection Measures

The following EPMs—general (GE); fish, vegetation, and wildlife (FVW); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on Indiana bats.

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety, and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies and groundwater wells, or as otherwise required by federal, state, or local regulations.
- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.
- (GE-20) – Clean Line will conduct construction and scheduled maintenance activities on the facilities during daylight hours, except in rare circumstances that may include, for example, to address emergency or unsafe situations, to avoid adverse environmental effects, to minimize traffic disruptions, or to comply with regulatory or permit requirements.
- (GE-21) – Clean Line will maintain construction equipment in good working order.
- (GE-22) – Clean Line will impose speed limits during construction for access roads (e.g., to reduce dust emissions, for safety reasons, and for protection of wildlife).
- (GE-25) – Clean Line will turn off idling equipment when not in use.

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.

- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.
- (FVW-6) – Clean Line will avoid and/or minimize construction within 300 feet of caves known to be occupied by threatened or endangered species.

Waters, Wetlands, and Floodplains EPMs:

- (W-3) – Clean Line will establish streamside management zones within 50 feet of both sides of intermittent and perennial streams and along margins of bodies of open water where removal of low-lying vegetation is minimized.
- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.

5.22.6.2 Species-specific Measures

In addition to the abovementioned EPMs, Clean Line will adhere to the following conservation measures that have been adapted from a recent biological opinion for a linear project being constructed in the Midwest Region (including part of Oklahoma) in the Indiana bat's range (USFWS 2013g) and comments from the USFWS on drafts of this document:

- Clean Line will coordinate with the USFWS to mitigate all impacts on occupied habitat by the Project.
- Where potential summer roosting habitat is found to be occupied, Clean Line will conduct tree clearing between November 1 and March 31.
- Clean Line will conduct pre-construction surveys according to the current *Range-wide Indiana Bat Summer Survey Guidelines* available at the time to determine whether Indiana bats are present or likely absent from all or portions of the Action Area (USFWS 2014a).
- If occupied maternity roost trees are identified, Clean Line will maintain a minimum of 100 feet between roost trees and construction areas. Clean Line will erect fencing to delineate the boundary and prevent inadvertent encroachment into the area, and erect signs stating "no trespassing" or "do not disturb – sensitive area." If it is not possible to avoid occupied roost trees by 100 feet, Clean Line will consult the USFWS.
- When drilling or blasting within 0.5 miles of a known or presumed occupied hibernacula entrances and passages, Clean Line will coordinate with the local USFWS office to ensure that the blasting will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the hibernacula.

- To minimize potential impacts on foraging Indiana bats during construction, Clean Line will limit clearing and heavy equipment operation activities within 300 feet of documented roost trees identified during pre-construction surveys to one-half hour after dawn to one-half hour before dusk from April 1 to November 1. This timing restriction will allow time for bats to return to roost trees at dawn and time for bats to emerge from roosts at dusk. If this is not possible, the USFWS would review these on a case-by-case basis after consultation is completed to ensure adequate protection of occupied maternity roost trees.

5.22.7 Effects Determination

Historically, prior to the emergence of WNS, the greatest threats to Indiana bats have largely been associated with impacts on occupied hibernacula and summer habitat (see Section 5.22.3 "Current Threats"). Existing, publicly available data and field studies conducted by Clean Line have not revealed any potential Indiana bat hibernacula occurring along a 300-foot study corridor centered on the Project's HVDC transmission line (see Section 5.22.4 "Potential Presence in the Action Area"). However, approximately 64.5 percent of the study corridor was not surveyed due to access restrictions. Clean Line will identify additional potential Indiana bat caves in unsurveyed areas prior to construction, as land access is granted. Clean Line is committed to avoiding or minimizing construction within 300 feet of occupied caves and will coordinate with the USFWS on seasonal or spatial restrictions to avoid or minimize potential impacts to sensitive areas during O&M, but with nearly two-thirds of the Project study area as yet to be surveyed, the Project may not be able to completely avoid all disturbance to potentially unidentified Indiana bat hibernacula.

Clean Line recorded 409 potential roost trees in the 300-foot Project study corridor within the Indiana bat's known range (see Table 5.22-4, "Number of Potential Indiana Bat Roost Trees in the Action Area by County," and Appendix D). Because approximately 64.5 percent of the Project study corridor in the Indiana bat's range was not surveyed for potential roost trees due to land access constraints, it is possible that more potential roost trees occur in these unsurveyed areas. In total, there are about 266,000 acres of forests in the Action Area, much of which lies outside the study corridor, that may provide additional potential roost trees (see Table 5.22-3, "Potential Indiana Bat Foraging Habitat Available in the Action Area"). Clean Line will identify any potential Indiana bat roost trees in the currently unsurveyed areas of the 300-foot Project study corridor prior to construction, as landowner access is obtained. Where summer roosting habitat is found to be occupied, Clean Line will clear trees outside of the summer resident season to avoid direct take of roosting bats (see Section 5.22.6.2, "Species-specific Measures"). If trees located outside the ROW need to be cleared during operations and maintenance, such as trees that may pose a danger to the facilities, Clean Line will apply EPM FVW-5 to avoid or minimize adverse effects.

Potential Indiana bat foraging habitat is common throughout the Action Area (see Table 5.22-3, "Potential Indiana Bat Foraging Habitat Available in the Action Area"), and would be subject to impacts where Project activities occur in and adjacent to these areas. Clean Line has committed to avoiding or minimizing impacts on environmentally sensitive vegetation and limiting the removal of vegetation along the margins of bodies of open water (see FVW-1 and W-3 in Section 5.22.6.2 "Environmental Protection Measures"). These measures would reduce the potential for loss or alteration of Indiana bat foraging habitat. Similarly, Clean Line will limit Project activities to daylight hours (GE-20), which would reduce the likelihood that noise diminishes the quality of foraging habitats for bats as they forage at night. Clean Line will also selectively apply herbicides in streamside management zones (W-4) and restrict refueling near waterbodies (GE-14) to minimize potential impacts on foraging habitats and Indiana bat prey. Finally, the environmental protection measures detailed in Section 5.22.6, "Protection

Measures," indicate that Clean Line will practice good housekeeping to prevent attracting predators or causing fires.

The implementation of the aforementioned protection measures would minimize most of the impacts on hibernacula and Indiana bat foraging habitats. However, 2014 bat surveys on 35.5 percent of the study corridor identified 409 potential roost trees. Undocumented, occupied hibernacula and additional potential roost trees also could be located in the remaining unsurveyed areas. The potential impacts on Indiana bats related to loss of potential roost trees or disturbance of potentially undiscovered, occupied hibernacula are not discountable or insignificant, even though Clean Line will clear trees in occupied Indiana bat summer habitat outside of the breeding season (see Section 5.22.6.2, "Species-specific Measures") to avoid direct mortality of individuals in their summer roosts and will avoid and/or minimize construction within 300 feet of occupied caves (see Section 5.22.6.2, "Species-specific Measures"). Clean Line will conduct pre-construction surveys to determine the presence or likely absence of Indiana bats in suitable summer habitat and potential hibernacula; however, this information will not be available prior to the completion of the Biological Assessment, so Clean Line must assume that some portion of the potential roost trees in the Project disturbance footprint will be used by Indiana bats as maternity roosts and that any potential caves in unsurveyed areas are occupied. For these reasons, the Project "may affect, and is likely to adversely affect" the Indiana bat.

Designated critical habitat for the Indiana bat does not exist in the Project or its vicinity; therefore, the Project will not adversely affect critical habitat for the species.

5.22.8 Cumulative Effects

The cumulative effects of non-Project-related future activities on Indiana bats are described below, which is a discussion necessitated by the fact that Indiana bats are likely to be adversely affected by the Project. This section considers future state, local, tribal, and private actions, not involving Federal activities, that are reasonably certain to occur within the Indiana bat Action Area.

The following activities have been identified as reasonably certain to occur within the Indiana bat Action Area:

- ***SH-10A in Muskogee and Sequoyah Counties, Oklahoma.*** ODOT (2013) plans to grade, drain, and surface the stretch of SH-10A that runs between SH-10 and SH-100. At the closest point, the project disturbance footprint lies about 1.7 miles southwest of this planned activity. This activity may result potential impacts on Indiana bats associated with temporary disturbances from crews and equipment in the Action Area during construction.
- ***I-40 near its Junction with SH-82, Sequoyah County, Oklahoma.*** ODOT (2013) plans two activities along this section of I-40, including a bridge and approach activity over Vian and Little Vian Creeks, and 6 miles of pavement rehabilitation. At the closest point, the project disturbance footprint lies about 1.5 miles northeast of this section of I-40. This activity may result in some vegetation clearing/maintenance, but potential impacts on Indiana bats in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.
- ***US-64 West of Sallisaw, Sequoyah County, Oklahoma.*** ODOT (2013) plans bridge and approaches activity at Big Sallisaw Creek. The location is about 2.4 miles south of the project disturbance footprint. This activity may result in some vegetation clearing/maintenance, but potential impacts on Indiana bats in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.

- ***SH-101 East of Sallisaw, Sequoyah County, Oklahoma.*** ODOT (2013) plans bridge and approaches activity at an unnamed creek that is about 0.6 miles north of the project disturbance footprint. This activity may result in some vegetation clearing/maintenance, but potential impacts on Indiana bats in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.
- ***AHTD District 4, Crawford County, Arkansas.*** The AHTD (2012, 2014a) has plans for programmed work on I-40 from the Oklahoma-Arkansas state line to an area west of Dyer, and has plans for new construction of US-71 from Alma south to an area east of Kibler, and to the Arkansas River southeast of Fort Smith. The project disturbance footprint would traverse the both of these activity segments. The new construction activities may require in some vegetation clearing/maintenance, which may result in impacts on Indiana bats and suitable habitat. Similarly, potential impacts on Indiana bats in the Action Area may also occur during construction for the I-40 work and new construction and would largely be associated with temporary disturbances from crews and equipment.
- ***AHTD District 8, Pope County, Arkansas.*** The AHTD (2014b) has plans for programmed road work on a short segment of SH-27 about 2.4 miles to the north of the project disturbance footprint. The AHTD has also announced plans to construct a Highway 7 bypass to the west of Dover (Crabtree 2013). At the closest point, the project disturbance footprint lies about 3 miles to the north of the Highway 7 bypass. The new bypass construction activities may require in some vegetation clearing/maintenance, which may result in impacts on Indiana bats and suitable habitat. Similarly, potential impacts on Indiana bats in the Action Area may also occur during construction for the SH-27 work and new bypass construction and would largely be associated with temporary disturbances from crews and equipment.
- ***AHTD District 8, Van Buren County, Arkansas.*** The AHTD (2014b) has plans for programmed road work on US-65 from Bee Branch to about 3 miles south. At the closest point, the project disturbance footprint lies about 1.7 miles to the south of the road work's southern end. This activity may result in some vegetation clearing/maintenance, but potential impacts on Indiana bats in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.
- ***AHTD District 5, Jackson County, Arkansas.*** The AHTD (2014c) has plans for programmed road work on US-167 in the small segment of the road going through the western edge of the county. The project disturbance footprint would traverse this road segment. This activity may result in some vegetation clearing/maintenance, but potential impacts on Indiana bats in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.

- **Green Meadows Development at Munford, Tennessee.** the Green Meadows Development is a planned community being constructed by the Green Meadows Development Corporation in Munford, Tennessee (Green Meadows 2014). The planned community will consist of more than 550 single-family homes construction over multiple phases covering 370 acres. The development will also include a small commercial district, community parks, several ponds, and a Green Belt walking trail system. A retirement community along with fitness center, tennis courts, and a pool is also planned as part of the community. This development is about 0.2 miles east of the terminus of the project disturbance footprint. This activity may result in the loss of suitable Indiana bat habitat from clearing activities during construction, as well as impacts associated with disturbances from the presence of crews and equipment. Any potential impacts on habitat from clearing would be permanent. Disturbance impacts would be permanent as well, because human activity would continue and likely increase after construction of the development.

5.23 Northern Long-eared Bat

The USFWS (2013a) published a proposed rule to list the northern long-eared bat (NLEB) (*Myotis septentrionalis*) as endangered under the ESA on October 2, 2013. Critical habitat for the NLEB was not proposed at that time. The proposed listing rule received a 60-day public comment period with an additional 30-day extension. The USFWS is now in the process of reviewing data and comments received by the public. The final decision must be made within 12 months of the date that the proposal to list was published.

5.23.1 Natural History

Range

The NLEB's range includes most of the eastern and north-central United States and all Canadian provinces west to southern Yukon Territory and eastern British Columbia (USFWS 2013a; USFWS 2013b). In the United States, its range encompasses 39 states from Maine south to the Florida Panhandle in the east and from Montana south to eastern Kansas and eastern Oklahoma in the west. The species is patchily distributed throughout most of its range, but is more frequently recorded in the northeastern United States, Ontario, and Quebec (USFWS 2013a). More than 780 hibernacula, many containing one to three NLEBs, have been documented in the United States.

Feeding

Northern long-eared bats are nocturnal insectivores that forage by hawking (catching insects in flight) or gleaning from vegetation and water surfaces (USFWS 2013a, 2013b). Moths, beetles, and spiders are among their most common prey. The bats forage beneath the tree canopy, typically 3 to 10 feet above the ground, on forested hillsides and ridges, and along riparian areas (Ollendorff 2002; USFWS 2013a, 2013b). They may also forage over forest clearings, open water, and along roads (USFWS 2013a). Northern long-eared bats emerge from their roosts after dusk to forage (Ollendorff 2002; USFWS 2013a). They rest periodically at night roosts, and a second peak of foraging activity typically occurs before dawn.

Spring and Summer Ecology

Northern long-eared bats generally emerge from their hibernacula in March or April (USFWS 2013a). They are not considered long-distance migrants and typically travel approximately 40 to 50 miles between hibernacula and summer habitats (USFWS 2013a; USFWS 2014a). Still, documented migration distances have varied, ranging from 5 to 168 miles. The spring migration period likely occurs from mid-March to mid-May (USFWS 2014a).

The USFWS (2014a) describes suitable summer habitat for the NLEB as consisting of a wide variety of forested/wooded habitats where they roost, forage, and travel. Summer habitat may also include some adjacent and interspersed non-forested habitats, such as emergent wetlands and farm ponds, and adjacent edges of agricultural fields, old fields, and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags that are greater than 3 inches in diameter at breast height that have exfoliating bark, cracks, crevices, and/or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable roosting habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet of other forested/wooded habitat. Northern long-eared bats have also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures are also considered potential summer habitat. Males and non-reproductive females may roost in caves and mines during the summer (USFWS 2013a, 2014a).

Roost trees are more often on upper and middle slopes where solar heating is increased (Lacki and Schwierjohann 2001). Male bats typically select smaller, younger trees than do females (Lacki and Schwierjohann 2001; Perry and Thill 2007; USFWS 2013a). In general, NLEB summer roost selection is similar to that of Indiana bats; however, NLEBs appear to be more opportunistic (USFWS 2013a). The USFWS (2014a) states that potential roost trees are greater than 3 inches in diameter at breast height; however, the average documented roost sizes of several studies have been larger, ranging from 11.8 to 24.8 inches in diameter at breast height (Foster and Kurta 1999; Carter and Feldhammer 2005; Lacki et al. 2009; Timpone et al. 2010). Thus, roosting NLEBs seem to prefer larger diameter trees.

Northern long-eared bats switch summer roosts every two to three days on average (USFWS 2013a). The longest documented amount of time spent at one roost was 11 nights in a human made structure (Timpone et al. 2010; USFWS 2013a). The bats may switch roosts for a number of reasons, including temperature, precipitation, predation, parasitism, and ephemeral roost sites (Carter and Feldhammer 2005; USFWS 2013a). Ephemeral roost sites refer to the need for bats to proactively seek new sites prior to their current roost becoming uninhabitable. This may be the most likely reason for regular roost switches. Several studies have investigated the distances traveled between roost sites, and distances varied by study (USFWS 2013a). Collectively, the reported distances traveled range from just a few feet to nearly 2.5 miles away. One study conducted in the Ouachita Mountains of Arkansas reported that most maternity colonies moved among snags that were within less than two hectares (5 acres) of each other (Perry and Thill 2007).

Pregnant females (mating discussed below in “Fall and Winter Ecology”) form maternity colonies upon arrival to their summer habitat. Maternity colonies are relatively small, typically consisting of 30 to 60 individual bats; however, as few as seven and as many as 100 individuals have been observed in NLEB maternity colonies (USFWS 2013a, 2013b). Female roost site selection, in terms of canopy cover and tree height, varies with reproductive stage. Relative to pre- and post-lactation periods, lactating NLEBs exhibit a propensity to roost higher in tall trees in landscapes with higher, more open canopies and lower tree density (Garroway and Broders 2008; USFWS 2013a).

Females give birth to a single pup between late May and late July, depending on latitude (USFWS 2013a; USFWS 2013b). Births in a maternity colony tend to be synchronous, with the majority of young born at the same time. Pups are nursed for approximately 18 to 21 days until they become volant (i.e., are able to fly). The earliest born pups may be volant by late June (USFWS 2013a) and may disperse soon after.

Fall and Winter Ecology

Northern long-eared bats generally arrive at hibernacula in August or September, but arrival dates range from late July to early October (USFWS 2013a). Mating begins as male NLEBs “swarm” the hibernacula, which consists of large numbers of bats flying in and out of caves from dusk to dawn, and initiate copulation. Females store sperm throughout the winter and delay fertilization until after spring emergence. The bats enter hibernation after swarming and mating has concluded. As with other species of Myotis, NLEBs hibernate during the winter to conserve energy from increased thermoregulatory demands and decreases in food availability. Hibernation may begin as early as August, but is typically initiated in October or November.

Northern long-eared bats tend to hibernate in small numbers, but often inhabit hibernacula with large numbers of other bat species (Ollendorff 2002; USFWS 2013a). They may occasionally occur in clusters with other species (USFWS 2013a). Bat species that commonly share hibernacula with NLEBs include little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), eastern small-footed bat (*Myotis leibii*), tri-colored bat (*Perimyotis subflavus*), and Indiana bat. Northern long-eared bats are more active than other species in their hibernacula, and often move between hibernacula during the winter (Caceres and Barclay 2000; USFWS 2013a). The reasons for the periods of winter activity are poorly understood, as

NLEBs do not feed while active in the winter (USFWS 2013a). However, it has been suggested that disturbance by researchers may be, in part, responsible for these movements.

Northern long-eared bats hibernate in caves, but also use human made structures, such as abandoned mines (USFWS 2013a, 2013b, 2014a). They exhibit site fidelity and return to the same hibernacula over multiple years; however, they may not necessarily return to the same hibernaculum in successive winters (Caceres and Barclay 2000; USFWS 2013a). The bats prefer large hibernacula with large passages and entrances, relatively constant, cooler temperatures between 32°F and 48°F, high humidity, and no air currents (USFWS 2013a, 2013b, 2014a). The species roosts in small crevices or cracks in hibernacula walls, but hang in open areas less frequently.

5.23.2 Population Status

Most records of NLEBs are documented at winter hibernacula (USFWS 2013a). The species typically occurs in low numbers, and often uses cracks or crevices as roosts, making them difficult to detect during hibernacula censuses. More than 780 hibernacula used by NLEBs have been identified; however, many of these hibernacula house only one to three individuals (USFWS 2013a, 2014a). Northern long-eared bats have experienced a steep decline of approximately 99% in the northeastern portion of their range, due to WNS. Historically, the species was most abundant in the eastern portion of its range (Caceres and Barkley 2000; USFWS 2013a). Historical and current range-wide population estimates for NLEBs are not available at this time.

The numbers of known hibernacula in states traversed by the Project are as follows (USFWS 2013a): Arkansas (20), Oklahoma (4), and Tennessee (11). The bats are typically found in very low numbers at known Arkansas hibernacula. In addition to the four known hibernacula in Oklahoma, the species has been recorded at 21 caves during the summer, seven of which are located in Ozark Plateau National Wildlife Refuge. Northern long-eared bats are one of the most common bats caught in mist-nets at cave entrances in the Ozarks of northeastern Oklahoma, and have also been captured in small numbers along creeks and riparian zones in eastern Oklahoma.

5.23.3 Current Threats

The USFWS considers WNS to be the most severe and immediate threat to NLEBs, sparking the decision to propose listing the species as endangered (USFWS 2013a, 2013b). White-nose syndrome, a fungal infection caused by *Geomyces destructans*, has recently caused or contributed to the death of millions of bats in North America, including NLEBs. Decreases in the number of bats at WNS-infected hibernacula range from 30% to 99% (USFWS 2013a). Northern long-eared bats have experienced a steep decline, estimated at approximately 99% in the northeastern portion of their range, due to WNS. White-nose syndrome has been documented in hibernacula in 25 states and five Canadian provinces. The fungus that causes WNS was recently detected in two caves in Arkansas (Sasse pers com 2013; USFWS 2013c; USGS 2014). To date, two bat deaths attributed to WNS have been documented in Arkansas (USFWS 2013c, 2014b). Hibernacula in northern and western Tennessee have been confirmed to be infected by the disease (USFWS 2012). Currently, Oklahoma is considered a WNS suspect state due to a bat from western Oklahoma that tested positive in 2010 for the fungus that causes WNS, but additional surveillance efforts since that time have not detected the fungus or disease (USFWS 2013c).

Disturbance of NLEB hibernacula pose a substantial threat to the species (USFWS 2013a, 2013b, 2014a). Overuse of hibernacula for commercial, recreational, scientific, and educational purposes have contributed to physical disturbances of hibernating bats, which may render caves unsuitable (USFWS 2013a). Disturbances of hibernating bats affect survival and reproduction, as bats are likely to arouse and expend valuable energy stores. Direct mortality by vandals has been documented; however, there is no evidence that vandalism-related mortalities have a population-level effect on the NLEBs.

Destruction or degradation of winter hibernacula and summer habitat have been identified as potential threats to NLEBs (USFWS 2013a, 2013b, 2014a). Anthropogenic alterations of bat hibernacula (i.e., caves and mines) have restricted bat flights and movement and resulted in changes in thermal regimes and airflow, which have rendered caves unsuitable for hibernating bats. Debris build-up at cave entrances has had similar deleterious effects on hibernacula conditions and habitat suitability (USFWS 2013a). The bats have also lost potential winter hibernacula due to mine closures. Summer roosting and foraging habitat may be threatened by development of forests and woodlands (USFWS 2013a, 2013b, 2014a). Anthropogenic activities such as highway and commercial development, mining, wind energy construction, and timber harvesting can result in the loss or alteration of NLEB summer habitat. Although loss and degradation of hibernacula and summer habitat have negative impacts on NLEBs and do continue to occur, these activities alone are not believed to have substantial population-level effects on NLEBs.

Collisions with human made objects are a growing concern, particularly mortalities associated with wind turbine collisions (USFWS 2013a, 2013b, 2014a). Barotrauma, or rapid decompression, may also cause mortalities in bats at wind turbines. Barotrauma occurs when bats fly near the outer portions or tips of rapidly moving turbine blades, which cause a rapid change in air pressure (Strickland et al. 2011). The air pressure difference causes the bat's lungs to expand rapidly, which results in small blood vessels breaking open and internal bleeding (Baerwald et al. 2008). Barotrauma does not appear to be an important source of bat mortality at wind farms, as originally hypothesized by Baerwald et al. (AWWI 2014). As of 2011, 13 NLEB mortalities had been recorded at North American wind energy facilities, which represented approximately 0.2% of total bat mortality to that date (USFWS 2013a). Wind energy development continues to grow in the species' range, and it may present adverse effects. However, existing data does not suggest that wind energy development alone has contributed to population declines of NLEBs.

Several additional factors may pose threats to NLEB populations, including disease (in addition to WNS), predation, climate change, and contaminants (USFWS 2013a). Individually, these threats are not believed to have notable population-level effects on NLEBs; however, the cumulative effects of these threats and others may be heightened by the severe impacts on the population attributed to WNS.

5.23.4 Potential Presence in the Action Area

Definition of the Action Area

The USFWS (2014a) recommends a series of conservation measures to avoid or minimize impacts on NLEBs. The measures include, but are not limited to, several different spatial and temporal buffers limiting activities in proximity to NLEB during certain times of the year. The largest of the spatial buffers is a recommended 5-mile buffer around known NLEB hibernacula for certain activities (e.g., clearing, noise, waste storage tanks) during spring staging and fall swarming. The USFWS notes that NLEB may be present at hibernacula during hibernation, but they also may be present in greater numbers within 5 miles of hibernacula during spring staging and fall swarming. Recommended spatial buffers during hibernation and around summer habitat are generally smaller than the 5 miles noted for staging and swarming seasons. Given that the 5-mile buffer is the most inclusive of those outlined in the USFWS guidance (2014a), the Action Area for the NLEB on the Project is considered to be the project disturbance footprint plus a 5-mile buffer where potentially suitable foraging habitat, maternity colonies, hibernacula, or other roosts are traversed by the Project within the NLEB's known range. The Project surveyed for potential karst/cave features and roost trees within a 300-foot corridor along the HVDC transmission line route in the summer of 2014 (see "Additional Desktop/Field Analyses" below). The identification of potential NLEB caves and roost trees in the Action Area is limited to the results of this field effort and existing, publicly available data.

Presence in the Action Area Based on Existing Data

Northern long-eared bats are known or believed to occur in the following counties proposed to be traversed by the Project: (Oklahoma) Muskogee, Okmulgee, and Sequoyah; (Arkansas) Cleburne, Conway, Crawford, Franklin, Jackson, Johnson, Poinsett, Pope, Van Buren, and White; and (Tennessee) Shelby and Tipton (see Figure 5.23-1, "Potential Presence of Northern Long-eared Bat in the Action Area) (USFWS 2014c). There are 20 known NLEB hibernacula in Arkansas, four in Oklahoma, and 11 in Tennessee (USFWS 2013a). The locations of these hibernacula are not publically available. Northern long-eared bats have been documented at 21 caves in Oklahoma during the summer. The locations of these caves also are not publicly available; however, seven of them are known to be located in Ozark Plateau National Wildlife Refuge. The southernmost unit of the refuge lies approximately 10 miles north of the Project as it traverses Sequoyah County. Northern long-eared bat populations have also been recorded during the summer in Arkansas. Perry and Thill (2007) conducted radio-tracking surveys of NLEBs in the Ouachita Mountains of northwestern Saline County between 2000 and 2005. Their study area lies approximately 40 miles south of the Project as it traverses Pope and Conway Counties.

Clean Line reviewed publically available land cover and hydrology data to evaluate the availability of NLEB foraging habitat in the Action Area (USGS 2012; Jin et al. 2013). NLEBs typically forage on forested hillsides and ridges, and along riparian areas (Ollendorff 2002; USFWS 2013a, 2013b). For the purposes of the data review, perennial streams (i.e., riparian areas) and forests, were considered potentially suitable habitats in which NLEBs could forage. Table 5.23-1, "Potential Northern Long-eared Bat Foraging Habitat Available in the Action Area," lists the potentially suitable habitat available to NLEBs in the Action Area. The forested areas listed in the table may also give an indication of the availability summer roosting habitat in Action Area beyond the areas surveyed during the field effort (see "Additional Desktop/Field Analyses" below). Perennial stream habitats are listed by total length in each county, while forests are listed by total acres in each county. Potential foraging habitat, according to Table 5.23-1, "Potential Northern Long-eared Bat Foraging Habitat Available in the Action Area," is available in all counties in the Action Area although the extent to which its available varies greatly between counties.

Table 5.23-1
Potential Northern Long-eared Bat Foraging Habitat Available in the Action Area

Location	Perennial Streams (miles)	Deciduous Forest (acres)	Evergreen Forest (acres)	Mixed Forest (acres)	All Forests (acres)
Arkansas					
Cleburne	57.1	28,510.9	10,332.5	8,661.7	47,505.1
Conway	21.	38,926.2	34,741.4	6,711.6	80,379.2
Crawford	124.9	31,690.2	11,280.0	5,534.6	48,504.8
Faulkner	29.7	18,792.7	4,935.5	2,737.6	26,465.8
Franklin	64.7	21,676.2	30,953.8	9,714.9	62,344.9
Jackson	110.12	20,396.10	772.53	5,247.37	26,416.0
Johnson	86.4	49,574.7	42,283.3	9,414.3	101,272.28
Poinsett	27.9	4,968.3	121.8	405.2	5,495.8
Pope	75.9	45,942.3	52,026.2	9,646.2	107,614.7
Van Buren	32.0	14,293.2	5,352.6	3,222.4	22,868.2

Table 5.23-1
Potential Northern Long-eared Bat Foraging Habitat Available in the Action Area

Location	Perennial Streams (miles)	Deciduous Forest (acres)	Evergreen Forest (acres)	Mixed Forest (acres)	All Forests (acres)
White	138.7	52,115.0	12,452.9	22,483.4	87,051.3
Oklahoma					
Muskogee	411.6	57,048.8	208.7	193.1	57,450.6
Okmulgee	376.2	52,169.6	9.0		52,178.6
Sequoyah	123.5	97,460.2	1,967.7	2,697.0	102,124.9
Tennessee					
Shelby	36.9	4,245.4	720.9	123.7	5,090.0
Tipton	38.1	13,037.3	328.4	150.1	13,515.8
Total	1,762.6	551,741.6	208,720.8	86,976.1	847,438.5

Sources: USGS 2012; Jin et al. 2013.

Additional Desktop/Field Analyses

Clean Line conducted surveys for subterranean features (i.e., caves, sinkholes, rock shelters, and other karst features) and potential roost trees that may be used by threatened and endangered bats, including NLEBs, during the summer and fall of 2014. The surveys were conducted along a 300-foot corridor centered on the HVDC transmission line route. Thirty subterranean features were recorded during these surveys, of which seven provide suitable conditions to support hibernating bats or maternity colonies, while six were determined to provide possible temporary bat roosting habitat. The potentially suitable hibernacula or maternity colony sites were all located in close proximity to each other in White County, Arkansas. The six potential temporary roosts included a cluster of three features in Crawford County, Arkansas [redacted] a cluster of two in Franklin County, Arkansas, and a single feature in Cleburne County, Arkansas. Approximately 39 percent of the total Project study area was surveyed within the NLEB's known range, as a lack of landowner permissions restricted access to remaining areas. In addition, no surveys were conducted in Okmulgee County, Oklahoma, which is also considered part of the species' range (USFWS 2014c).

A total of 607 potential roost trees were documented during the summer 2014 field effort within the NLEB's known range. Table 5.23-2, "Number of Potential Northern Long-eared Bat Roost Trees in the Action Area by County," lists the number of potential roost trees recorded by county, and includes the average number of potential roost trees observed by mile. Refer to the "Bat Habitat Assessment of the Clean Line Plains & Eastern Transmission Line Project, Oklahoma, Arkansas, and Tennessee" in Appendix D and the "Re-Evaluation of Select Karst Features along the Plains & Eastern Clean Line Transmission Line Project, Oklahoma, Arkansas, and Tennessee" in Appendix E for full details on these survey efforts.

Table 5.23-2
Number of Potential Northern Long-eared Bat Roost Trees in the Action Area by County

County	Number of Potential Roost Trees	Average Potential Roost Trees per Mile
Muskogee, OK	125	3.8
Sequoyah, OK	137	8.3
Crawford, AR	37	3.8
Franklin, AR	24	3.7
Johnson, AR	90	5.9
Pope, AR	41	3.9
Conway, AR	30	4.9
Van Buren, AR	5	4.3
Cleburne, AR	43	5.1
White, AR	41	5.8
Jackson, AR	26	7.6
Poinsett, AR	2	0.5
Tipton, TN	2	0.3
Shelby, TN	4	1.8
Total	607	4.6

Source: _Bat Habitat Assessment of the Clean Line Plains & Eastern Transmission Line Project, Oklahoma, Arkansas, and Tennessee_ (Appendix D).

5.23.5 Direct and Indirect Impacts

Direct Mortality/Injury

ROW clearing and maintenance activities, which would occur during construction and to a limited extent may be required during operations and maintenance of the project could directly cause mortality or injury to NLEBs if occupied roost trees are cleared. Clean Line documented 607 potential roost trees within the 300-foot study corridor centered on the HVDC transmission line in the NLEB's known range (see Table 5.23-2, "Number of Potential Northern Long-eared Bat Roost Trees in the Action Area by County," and Appendix D). Since approximately 61 percent of the Project study corridor in the NLEB's range was not surveyed for potential roost trees due to land access constraints, it is possible that potential roosts occur in these unsurveyed areas. In total, there are almost 850,000 acres of forests in the Action Area, the majority of which lie outside the study corridor, that may provide additional potential roost trees (Table 5.23-1, "Potential Northern Long-eared Bat Foraging Habitat Available in the Action Area"). Where summer roosting habitat is found to be occupied, Clean Line will clear trees outside of the summer resident season to avoid direct take of roosting NLEBs (see Section 5.23.6.2, "Species-specific Measures"; FVW-5 Section 5.23.6.1, "Environmental Protection Measures"). Clean Line will also identify any potential NLEB roost trees in the currently unsurveyed areas of the 300-foot Project study corridor prior to construction, as landowner access is obtained, and apply the same measures to any newly identified roost trees.

The potential for direct mortalities and injuries also exists if drilling or blasting occurs in proximity to occupied hibernacula or summer roosts in caves or mines. There were seven subterranean features with conditions potentially suitable for hibernating bats and six features that may provide potential temporary bat roosts identified during 2014 field surveys (see Appendix D and Appendix E). Clean Line will avoid and/or minimize construction within 300 feet of caves known to be occupied by NLEBs (see FVW-6 in Section 5.23.6.1, "Environmental Protection Measures"), which would minimize this impact, and will coordinate with the USFWS on seasonal or spatial restrictions to avoid or minimize potential impacts to sensitive areas during O&M. Since approximately 61 percent of the Project survey area in the NLEB's range was not surveyed for subterranean features due to land access constraints, it is possible that additional potential hibernacula occur in these unsurveyed areas. Clean Line will identify any potential NLEB caves in the currently unsurveyed areas of the 300-foot Project study corridor prior to construction, as landowner access is obtained, and apply the same measures to any newly identified caves.

Northern long-eared bats also are at risk of collisions with Project vehicles during all phases, as the species is known to forage along roads. Clean Line will implement several measures (see Section 5.23.6, "Protection Measures") to reduce the risk of NLEB-vehicle collisions, including imposing Project speed limits (GE-22) and limiting work to daytime hours, when possible (GE-20).

Mortalities and/or injuries could also directly result from several other Project activities. Herbicide use for weed control, as well as fuel and other chemical spills, could cause mortality or illness in any bat that comes in direct contact with the spill. Similarly, spills could cause mortality or illness indirectly if water or prey are contaminated. However, Clean Line would keep emergency and spill response equipment available during all Project activities so that spills would be promptly contained, thus reducing potential adverse effects on NLEBs (see GE-13 in Section 5.23.6.1, "Environmental Protection Measures"). Similarly, accidental fires caused by project personnel or equipment, depending on their severity, may cause direct mortality or injure bats if roost trees are burned. Keeping equipment in good working order (GE-21) and turning off idling equipment would reduce the possibility of igniting fires.

Sensory Disturbance

Northern long-eared bats could be disturbed by Project-related noise and vibrations during construction, operations, and decommissioning, if activities occur in close proximity to occupied maternity colonies, summer roosts, or hibernacula. Disturbance of winter hibernacula could cause bats to arouse and increase their metabolism, thus resulting in loss of energy reserves and decreasing survival. Maternity colonies may be susceptible to sensory disturbances from Project activities during summer months. Any disturbances to these colonies could negatively impact the health and survival of pups. Seven karst features with conditions appropriate to support potential hibernacula were identified during field surveys in White County, Arkansas. In addition, the six potential temporary bat roosts recorded in Cleburne, Crawford, and Franklin Counties, Arkansas would be susceptible to sensory disturbance if occupied (see Appendix D and Appendix E). There were also 607 potential roost trees identified in the 300-foot Project study corridor that may support maternity colonies or summer roosts. Still, hibernacula and potential roost trees may be present in the remaining unsurveyed areas of the Action Area. Clean Line will avoid and/or minimize construction within 300 feet of caves known to be occupied by NLEBs to reduce sensory disturbance impacts on the species and will coordinate with the USFWS on seasonal or spatial restrictions to avoid or minimize potential sensory disturbance during O&M (see FVW-6 and FVW-5 in Section 5.23.6.1, "Environmental Protection Measures"). Clean will also identify environmentally sensitive vegetation (e.g., roost trees) and minimize impacts, particularly during the maternity season (see FVW-1 and FVW-5 in Section 5.23.6.1, "Environmental Protection Measures"). Clean Line will identify any potential NLEB hibernacula or roost trees in the currently unsurveyed areas of the 300-foot Project survey corridor prior to construction, as landowner access is obtained, and apply the same measures to any newly identified features.

Research has indicated that bats may be more likely to avoid foraging in areas with intense, broadband background noise, such as traffic (Schaub, Ostwald, and Siemers 2008). As such, Project-related noise may degrade foraging habitats temporarily when Project activities occur in proximity. Potential NLEB foraging habitat is available in all counties in the Action Area (see Table 5.23-1, "Potential Northern Long-eared Bat Foraging Habitat Available in the Action Area"). Clean Line will restrict Project activities to daylight hours (see GE-20 in Section 5.23.6.1, "Environmental Protection Measures"), which would largely avoid Project-related noise impacts on foraging bats in the Action Area. Sensory disturbance impacts on NLEBs would be short term, lasting only as long as Project crews and equipment were in a given area, although impacts have the potential for greater effects on local populations.

Habitat Loss/Alteration

Northern long-eared bats may be indirectly impacted by fragmentation and removal of forest and woodland habitats during grading, clearing, and excavating activities. They may benefit from some habitat removal, as several studies have indicated that females may select roosts associated with partially harvested forests (USFWS 2013a). Furthermore, clearing the ROW creates edge habitat that could be used as foraging pathways by NLEBs. Still, negative impacts also are possible as the availability of roosts may be diminished and fragmentation decreases connectivity between forest/woodland habitats. Mature forests are an important habitat type for foraging NLEBs (USFWS 2013a). There are almost 850,000 acres of forest in the Action Area (see Table 5.23-1, "Potential Northern Long-eared Bat Foraging Habitat Available in the Action Area"). There are also about 1,762 miles of perennial streams, which also potentially serve as NLEB foraging habitat. Any removal or alteration of these potential foraging areas by the Project may result in reduction of the quality of the habitat at the impacted locations. Potential impacts on roosting habitat are expected to be long term or permanent, as forests/woodlands would require more than five years to be restored to pre-construction conditions or would not be restored at all. Northern long-eared bats also may forage for insects near water sources. Alterations to aquatic habitats that alter prey availability or contaminate prey could have indirect negative impacts on the species.

Several additional Project-related factors could result in habitat alteration and/or loss. Sensory disturbance associated with the increased presence of personnel and equipment during construction and decommissioning could cause NLEBs to flee or avoid areas of temporary Project activity. This would effectively and indirectly amount to temporary habitat loss, although the associated impacts would be short term and would end when Project activities ceased. Any sensory disturbance occurring during typical O&M activities, such as vegetation management within the ROW would be minimal, with activities only occurring for a short time, and is not expected to result in habitat loss. Spills and sediment from Project sources could also alter both aquatic and terrestrial habitats and the invertebrates on which NLEBs may feed. In addition, fire associated with construction equipment and personnel could result in habitat loss or alteration. The effects of spills and fires on habitat would result in indirect impacts on NLEBs and would typically be short term; however, long-term impacts are possible, depending on the severity of the incident and response efforts. These impacts would be reduced by the implementation of protection measures (see Section 5.23.6, "Protection Measures").

Increased Predation

Predators may also increase due to factors such as habitat alteration and trash. Trash created by Project personnel can attract known predators like raccoons. Clean Line would practice good housekeeping to minimize the presence of trash from the Project during all phases of the Project. Predation associated with Project activities is expected to have a negligible impact on NLEBs, as Clean Line will practice good housekeeping during all phases of the Project and this species generally experiences a very small amount of predation (USFWS 2013a).

5.23.6 Protection Measures

Clean Line has agreed to a number of measures to avoid or minimize impacts on NLEBs. These measures include the Clean Line-designated EPMs outlined in Section 2.5, "Environmental Protection Measures," and species-specific measures described in the USFWS *Northern Long-eared Bat Interim Conference and Planning Guidance* (USFWS 2014a). Collectively, the EPMs and species-specific measures are referred to as "protection measures."

5.23.6.1 Environmental Protection Measures

The following EPMs—general (GE); fish, vegetation, and wildlife (FVW); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on NLEBs.

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety, and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.
- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies and groundwater wells, or as otherwise required by federal, state, or local regulations.
- (GE-20) – Clean Line will conduct construction and scheduled maintenance activities on the facilities during daylight hours, except in rare circumstances that may include, for example, to address emergency or unsafe situations, to avoid adverse environmental effects, to minimize traffic disruptions, or to comply with regulatory or permit requirements.
- (GE-21) – Clean Line will maintain construction equipment in good working order.
- (GE-22) – Clean Line will impose speed limits during construction for access roads (e.g., to reduce dust emissions, for safety reasons, and for protection of wildlife).
- (GE-25) – Clean Line will turn off idling equipment when not in use.

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.

- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.
- (FVW-6) – Clean Line will avoid and/or minimize construction within 300 feet of caves known to be occupied by threatened or endangered species.

Waters, Wetlands, and Floodplains EPMs:

- (W-3) – Clean Line will establish streamside management zones within 50 feet of both sides of intermittent and perennial streams and along margins of bodies of open water where removal of low-lying vegetation is minimized.
- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.

5.23.6.2 Species-specific Measures

In addition to the abovementioned EPMs, Clean Line will adhere to the following species-specific measures that have been adapted from USFWS guidance (2014a) and comments on drafts of this document:

- Clean Line will coordinate with the USFWS to mitigate all impacts on occupied habitat by the Project.
- If occupied maternity roost trees are identified, Clean Line will maintain a minimum of 100 feet between roost trees and construction areas. Clean Line will erect fencing to delineate the boundary and prevent inadvertent encroachment into the area, and erect signs stating "no trespassing" or "do not disturb – sensitive area." If it is not possible to avoid occupied roost trees by 100 feet, Clean Line will consult the USFWS.
- Clean Line will avoid woody vegetation or spoil (e.g., soil, rock, etc.) disposal within 100 feet of known or assumed NLEB hibernacula entrances and associated sinkholes, fissures, or other karst features.
- When drilling or blasting within 0.5 miles of a known or presumed occupied hibernacula entrances and passages, Clean Line will coordinate with the local USFWS office to ensure that the blasting will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the hibernacula.
- Clean Line will conduct pre-construction surveys according to the most up-to-date NLEB planning guidance available at the time to determine whether NLEBs are present or likely absent from all or portions of the Action Area (USFWS 2014a).
- Where potential summer roosting habitat is found to be occupied, Clean Line will conduct tree clearing between November 1 and March 31.

- To minimize potential impacts on foraging NLEBs during construction, Clean Line will limit clearing and heavy equipment operation activities within 300 feet of documented roost trees identified during pre-construction surveys to one-half hour after dawn to one-half hour before dusk from April 1 to November 1. This timing restriction will allow time for bats to return to roost trees at dawn and time for bats to emerge from roosts at dusk. If this is not possible, the USFWS would review these on a case-by-case basis after consultation is completed to ensure adequate protection of occupied maternity roost trees.

5.23.7 Effects Determination

The emergence of WNS currently poses the greatest threat to NLEBs; however, disturbances of hibernacula and the loss or alteration of winter and summer habitat also pose substantial threats (USFWS 2013a, 2013b, 2014a). Clean Line's 2014 bat habitat assessment field surveys revealed seven subterranean features that could potentially support NLEB hibernation along a 300-foot study corridor centered on the Project's HVDC transmission line in White County, Arkansas (see Section 5.23.4 "Potential Presence in the Action Area"). However, approximately 61 percent of the study corridor was not surveyed due to access restrictions. Clean Line will identify additional potential NLEB caves in unsurveyed areas prior to construction, as land access is granted. Clean Line is committed to avoiding or minimizing construction within 300 feet of occupied caves and will coordinate with the USFWS on seasonal or spatial restrictions to avoid or minimize potential impacts to sensitive areas during O&M, but with seven potential hibernacula/maternity roosts located in the survey area and the potential for hibernacula or roosts in currently unsurveyed areas, the Project may not be able to completely avoid all disturbance to NLEBs.

Clean Line recorded 607 potential roost trees in the 300-foot Project study corridor within the NLEB's known range (see Table 5.23-2, "Number of Potential Northern Long-eared Bat Roost Trees in the Action Area by County," and Appendix D). Since approximately 61 percent of the Project study corridor in the NLEB's range was not surveyed for potential roost trees due to land access constraints, it is possible that more potential roost trees occur in these unsurveyed areas. In total, there are almost 850,000 acres of forests in the Action Area that may provide additional potential roost trees; however, much of this habitat lies outside the study corridor (see Table 5.23-1, "Potential Northern Long-eared Bat Foraging Habitat Available in the Action Area"). Clean Line will identify any potential NLEB roost trees in the currently unsurveyed areas of the 300-foot Project study corridor prior to construction, as landowner access is obtained. Where suitable summer roosting habitat is found to be occupied, Clean Line will not conduct tree clearing during the summer resident season to avoid the potential for direct take of roosting bats (see Section 5.23.6.2, "Species-specific Measures"). If trees located outside the ROW need to be cleared during O&M, such as trees that may pose a danger to the facilities, Clean Line will apply EPM FVW-5 to avoid or minimize adverse effects.

Potential NLEB foraging habitat is common throughout the Action Area (see Table 5.23-1, "Potential Northern Long-eared Bat Foraging Habitat Available in the Action Area"), and would be subject to impacts where Project activities occur in and adjacent to these areas. Clean Line has committed to avoiding or minimizing impacts on environmentally sensitive vegetation and limiting the removal of vegetation along the margins of bodies of open water (see FVW-1 and W-3 in Section 5.23.6.2 "Environmental Protection Measures"). These measures would reduce the potential for loss or alteration of NLEB foraging habitat. Similarly, Clean Line will limit Project activities to daylight hours (GE-20), which would reduce the likelihood that noise diminishes the quality of foraging habitats for bats as they forage at night. Clean Line will also selectively apply herbicides in streamside management zones (W-4) and restrict refueling near waterbodies (GE-14) to minimize potential impacts on foraging habitats and NLEB prey. Finally, the environmental protection measures detailed in Section 5.23.6, "Protection

Measures," indicate that Clean Line will practice good housekeeping to prevent attracting predators or causing fires.

The implementation of the aforementioned protection measures would minimize most of the impacts on hibernacula and NLEB habitats. Despite these efforts to reduce impacts on NLEB, 607 potential roost trees and seven subterranean features with potential to support bat hibernacula were identified during field surveys and 61 percent of the study corridor has not yet been surveyed. The potential impacts on NLEBs related to loss of potential roost trees and disturbances to potential hibernacula are not discountable or insignificant, even though Clean Line will clear trees in occupied NLEB summer habitat outside of the breeding season (see Section 5.23.6.2, "Species-specific Measures") to avoid direct mortality of individuals in their summer roosts and will avoid and/or minimize construction within 300 feet of occupied caves (see FVW-6 in Section 5.23.6.1, "Environmental Protection Measures"). Clean Line will conduct pre-construction surveys to determine the presence or likely absence of NLEBs in suitable summer habitat; however, this information will not be available prior to the completion of the Biological Assessment, so Clean Line must assume that some portion of the potential roost trees in the Project disturbance footprint will be used by NLEBs as maternity roosts and that the seven documented potential caves or any potential undiscovered caves in unsurveyed areas are occupied. For these reasons, the Project "may affect, and is likely to adversely affect" the NLEB.

Critical habitat has not been designated for the NLEB; therefore, the Project "will not destroy or adversely modify" critical habitat for the species.

5.23.8 Cumulative Effects

The cumulative effects of non-Project-related future activities on NLEBs are described below, which is a discussion necessitated by the fact that NLEBs are likely to be adversely affected by the Project. This section considers future state, local, tribal, and private actions, not involving Federal activities, that are reasonably certain to occur within the NLEB Action Area.

The following activities have been identified as reasonably certain to occur within the NLEB Action Area:

- ***US-75A from Beggs to the County Line, Okmulgee County, Oklahoma.*** ODOT (2013) plans to grade, drain, and surface this stretch of US-75A. The project disturbance footprint would traverse US-75A about 2 miles north of Beggs. This activity may result potential impacts on NLEBs associated with temporary disturbances from crews and equipment in the Action Area during construction.
- ***US-75 North of Okmulgee, Okmulgee County, Oklahoma.*** ODOT (2013) plans two activities for this segment of US-75 that runs north from the community of Okmulgee across SH-16 to a location about 2 miles north of SH-16, including left turn lane intersection modifications from about Preston to 2 miles north of SH-16, and a bridge and approaches for the overpass over SH-16. The project disturbance footprint would traverse US-75 at about the northern extent of the intersection modifications and would be about 1.6 miles to the northeast of the overpass location. These activities may result in some vegetation clearing/maintenance, but potential impacts on NLEBs in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.

- ***US-62, Northwest Corner of Muskogee County, Oklahoma.*** ODOT (2013) plans a bridge and approaches activity on US-62 at Cane Creek about 1.3 miles south of where US-62 joins SH-72 and turns south. The project disturbance footprint would traverse US-62 about 0.1 miles north of this activity. This activity may result in some vegetation clearing/maintenance, but potential impacts on NLEBs in the Action Area would largely be associated with temporary disturbances from crews and equipment during construction.
- ***SH-10A in Muskogee and Sequoyah Counties, Oklahoma.*** ODOT (2013) plans to grade, drain, and surface the stretch of SH-10A that runs between SH-10 and SH-100. At the closest point, the project disturbance footprint lies about 1.7 miles southwest of this planned activity. This activity may result potential impacts on NLEBs associated with temporary disturbances from crews and equipment in the Action Area during construction.
- ***I-40 near its Junction with SH-82, Sequoyah County, Oklahoma.*** ODOT (2013) plans two activities along this section of I-40, including a bridge and approach activity over Vian and Little Vian Creeks, and 6 miles of pavement rehabilitation. At the closest point, the project disturbance footprint lies about 1.5 miles northeast of this section of I-40. These activities may result in some vegetation clearing/maintenance, but potential impacts on NLEBs in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.
- ***I-40 along the South Side of Sallisaw, Sequoyah County, Oklahoma.*** ODOT (2013) plans multiple activities along this section of the highway, including 5 miles of pavement rehabilitation, a bridge and approach over Big Sallisaw Creek, a bridge and approach over a county road and railroad, and the I-40/US-64 interchange. This section of I-40 is between 3 and 3.5 miles south of the project disturbance footprint. These activities may result in some vegetation clearing/maintenance, but potential impacts on NLEBs in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.
- ***US-64 West of Sallisaw, Sequoyah County, Oklahoma.*** ODOT (2013) plans bridge and approaches activity at Big Sallisaw Creek. The location is about 2.4 miles south of the project disturbance footprint. This activity may result in some vegetation clearing/maintenance, but potential impacts on NLEBs in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.
- ***US-59 in Sallisaw, Sequoyah County, Oklahoma.*** ODOT (2013) plans to grade, drain, and surface 3.5 miles of US-59, north from its intersection with US-64. The project disturbance footprint would traverse the highway location at about 2.6 miles north of US-64. This activity may result potential impacts on NLEBs associated with temporary disturbances from crews and equipment in the Action Area during construction.
- ***SH-101 East of Sallisaw, Sequoyah County, Oklahoma.*** ODOT (2013) plans bridge and approaches activity at an unnamed creek that is about 0.6 miles north of the project disturbance footprint. This activity may result in some vegetation clearing/maintenance, but potential impacts on NLEBs in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.

- ***AHTD District 4, Crawford County, Arkansas.*** The AHTD (2012, 2014a) has plans for programmed work on I-40 from the Oklahoma-Arkansas state line to an area west of Dyer, and has plans for new construction of US-71 from Alma south to an area east of Kibler, and to the Arkansas River southeast of Fort Smith. The project disturbance footprint would traverse the both of these activity segments. The new construction activities may require in some vegetation clearing/maintenance, which may result in impacts on NLEBs and suitable habitat. Similarly, potential impacts on NLEBs in the Action Area may also occur during construction for the I-40 work and new construction and would largely be associated with temporary disturbances from crews and equipment.
- ***AHTD District 4, Franklin County, Arkansas.*** The AHTD (2014a) has plans for programmed road work on SH-23 that begins over 4 miles to the north of the project disturbance footprint and then extends northward. This activity may result in some vegetation clearing/maintenance, but potential impacts on NLEBs in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.
- ***AHTD District 8, Pope County, Arkansas.*** The AHTD (2014b) has plans for programmed road work on a short segment of SH-27 about 2.4 miles to the north of the project disturbance footprint. The AHTD has also announced plans to construct a Highway 7 bypass to the west of Dover (Crabtree 2013). At the closest point, the project disturbance footprint lies about 3 miles to the north of the Highway 7 bypass. The new bypass construction activities may require in some vegetation clearing/maintenance, which may result in impacts on NLEBs and suitable habitat. Similarly, potential impacts on NLEBs in the Action Area may also occur during construction for the SH-27 work and new bypass construction and would largely be associated with temporary disturbances from crews and equipment.
- ***AHTD District 8, Conway County, Arkansas.*** The AHTD (2014b) has plans for programmed work on SH-92 from 2.9 miles east of the junction with SH-9 east to the Conway-Van Buren county line. The project disturbance footprint would generally parallel this activity, and would be about 0.9 miles to the south of SH-92 at the closest point. This activity may result in some vegetation clearing/maintenance, but potential impacts on NLEBs in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.
- ***AHTD District 8, Van Buren County, Arkansas.*** The AHTD (2014b) has plans for programmed road work on US-65 from Bee Branch to about 3 miles south. At the closest point, the project disturbance footprint lies about 1.7 miles to the south of the road work’s southern end. This activity may result in some vegetation clearing/maintenance, but potential impacts on NLEBs in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.
- ***AHTD District 5, Cleburne County, Arkansas.*** The AHTD (2014c) has plans for programmed road work on two short segments of SH-16 near the Cleburne-White county line. The project disturbance footprint would occur between 4 and 5 miles south of these segments. These activities may result in some vegetation clearing/maintenance, but potential impacts on NLEBs in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.

- ***AHTD District 5, Jackson County, Arkansas.*** The AHTD (2014c) has plans for programmed road work on US-167 in the small segment of the road going through the western edge of the county. The project disturbance footprint would traverse this road segment. This activity may result in some vegetation clearing/maintenance, but potential impacts on NLEBs in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.
- **Green Meadows Development at Munford, Tennessee.** the Green Meadows Development is a planned community being constructed by the Green Meadows Development Corporation in Munford, Tennessee (Green Meadows 2014). The planned community will consist of more than 550 single-family homes construction over multiple phases covering 370 acres. The development will also include a small commercial district, community parks, several ponds, and a Green Belt walking trail system. A retirement community along with fitness center, tennis courts, and a pool is also planned as part of the community. This development is about 0.2 miles east of the terminus of the project disturbance footprint. This activity may result in the loss of suitable NLEBs habitat from clearing activities during construction, as well as impacts associated with disturbances from the presence of crews and equipment. Any potential impacts on habitat from clearing would be permanent. Disturbance impacts would be permanent as well, because human activity would continue and likely increase after construction of the development.

5.24 Ozark Big-eared Bat

The USFWS listed the Ozark big-eared bat (*Corynorhinus townsendii ingens*) as endangered on December 31, 1979 (USFWS 1979). Critical habitat has not been designated for the Ozark big-eared bat.

5.24.1 Natural History

Range

The Ozark big-eared bat is a subspecies of Townsend's big-eared bat (*Corynorhinus townsendii*) with a limited distribution in the Ozark Highlands and Boston Mountains ecoregions of northeastern Oklahoma and northwestern and north-central Arkansas (Stark 2008; Boyles, Timpone, and Robbins 2009; USFWS 2011). Historically, they occurred in Barry and Stone Counties in extreme southwestern Missouri, but are considered extirpated from the state (Stark 2008; Boyles, Timpone, and Robbins 2009; USFWS 2014a). As of 2008, there were 20 essential (i.e., used as a maternity site or hibernacula) caves within the Ozark big-eared bat's range (Stark 2008). These caves are used by 10 maternity colonies and eight winter colonies. The remaining two caves are used by Ozark big-eared bats during the fall only. The exact locations of these caves are confidential. The subspecies' range relative to the Project is discussed in detail in Section 5.24.4, "Potential Presence in the Action Area."

Feeding

Ozark big-eared bats typically forage in forests and edge habitats (USFWS 2011). They are often associated with oak and oak-hickory forests and tend to avoid areas of human development and cropland (Boyles, Timpone, and Robbins 2009; ODWC 2011; USFWS 2011). The subspecies emerges between 20 and 60 minutes after sunset and travels up to 2.8 miles to forage, although foraging typically occurs within 1.25 miles (Boyles, Timpone, and Robbins 2009; Graening et al. 2011). Ozark big-eared bats forage above the tree canopy and in gaps and clearings in forests (ODWC 2011). They primarily feed on moths, but may also glean beetles and other flying insects (Boyles, Timpone, and Robbins 2009; USFWS 2011).

Spring and Summer Ecology

Ozark big-eared bats are cave obligates, using limestone and sandstone talus caves or mines (Stark 2008; Boyles, Timpone, and Robbins 2009; ODWC 2011). Hibernating colonies gradually begin to disband in the spring from April through May (USFWS 2011). Ozark big-eared bats are non-migratory but may move short distances among caves between seasons. They exhibit site fidelity and typically return to the same hibernacula and maternity caves each year (Stark 2008; Boyles, Timpone, and Robbins 2009; Graening et al. 2011; ODWC 2011; USFWS 2011). Ozark big-eared bats have small home ranges compared to other bats, with the longest tracked movement being approximately 4.5 miles (Graening et al. 2011). Evidence suggests that females will not re-colonize a cave after a previous population has been extirpated (Boyles, Timpone, and Robbins 2009). They typically roost near the entrance of caves (ODWC 2011). Habitats in the surrounding landscape may not be a notable factor in cave selection; however, Ozark big-eared bats may be strongly influenced by habitats with favorable prey distributions (Clark et al. 1996; Wethington et al. 1996, 1997; Stark 2008).

Pregnant females (mating discussed below in "Fall and Winter Ecology") congregate at warm maternity caves between late April and early June (Boyles, Timpone, and Robbins 2009; USFWS 2011). The maternity colonies of Ozark big-eared bats are relatively small compared to other cave-dwelling bats, typically consisting of less than 500 individual bats (Boyles, Timpone, and Robbins 2009). Ozark big-eared bats give birth to a single offspring in May or June after a two to three month gestation period (Boyles, Timpone, and Robbins 2009; USFWS 2011). Young bats begin flying at three weeks and are weaned at about six weeks. Maternity colonies usually begin to disband in August (USFWS 2011). Males are solitary during the summer maternity season.

Fall and Winter Ecology

Ozark big-eared bats mate during the fall and winter; however, females store sperm and delay fertilization until after spring emergence (Boyles, Timpone, and Robbins 2009; USFWS 2011). Colonies comprising both sexes begin to form at hibernacula in October and November. They hibernate in clusters that range from 2 to 135 individuals (Boyles, Timpone, and Robbins 2009; USFWS 2011). Hibernating Ozark big-eared bats typically seek out the coldest regions of selected caves with temperatures between 46°F and 50°F and humidity of 86% to 93% (Wethington et al. 1997; Stark 2008; Boyles, Timpone, and Robbins 2009). Some Ozark big-eared bats may be active on winter nights, even during subfreezing temperatures (Boyles, Timpone, and Robbins 2009). Similarly, individuals may move between nearby caves during the fall and winter.

5.24.2 Population Status

Since 1973, Ozark big-eared bat total population estimates ranged from a low of 100 in 1973 to a high of 2,500 in 1990 using various survey techniques and estimation methods (Boyles, Timpone, and Robbins 2009; Graening et al. 2011). Ozark big-eared bat total population estimates for the 2006 to 2010 maternity seasons were 1,900, 1,600, 1,800, 1,500, and1,200, respectively (Graening et al. 2011). This suggests that counts are variable but perhaps trending downward. Published population estimates are not currently available for years after 2010. Maternity and winter counts exhibited a significant increase in the more than four decades that colonies have been surveyed (Graening et al. 2011). Data indicate that total summer population counts are higher than winter counts despite the fact that juveniles are present during winter counts (Stark 2008; Graening et al. 2011). This suggests that important hibernacula remain undiscovered.

5.24.3 Current Threats

The primary threats to Ozark big-eared bats are human disturbance of occupied caves and loss of habitat (Graening et al. 2011; ODWC 2011; USFWS 2011). The human population in the Ozarks region is growing rapidly (Stark 2008). As these areas become more populated, disturbance of Ozark big-eared bat caves will likely increase. Ozark big-eared bats are susceptible to frequent disturbance by spelunkers because these bats often roost near cave entrances (Graening et al. 2011; ODWC 2011; USFWS 2011). Vandalism of occupied caves is also a suspected source of disturbance (ODWC 2011). Despite the fact that this bat is occasionally active during winter, disturbance of this subspecies during the winter could cause them to arouse and increase their metabolism, thus resulting in loss of energy reserves needed to sustain them through the winter (Graening et al. 2011; ODWC 2011). Human disturbance at Ozark big-eared bat caves during maternity season may cause abandonment of their young or the caves (Stark 2008). Protections are in place for most Ozark big-eared bat occupied caves; however, disturbances (e.g., vandalism, unauthorized recreation) may still persist despite these protections. In addition, there may be undiscovered caves that are not protected from disturbances.

Human population growth rates within the Ozark big-eared bat's range increase the loss and fragmentation of their foraging habitat (Stark 2008; Graening et al. 2011; ODWC 2011). Stark (2008) provides the following example of these growth rates: "the human population of Washington and Benton County, Arkansas, and Adair and Cherokee counties, Oklahoma, increased 39.0%, 59.0%, 14.2%, and 24.9%, respectively, from 1990 to 2000." These human population growth rates are well above the state and national rates for that time period. Development of forested areas in their range reduces the subspecies' available foraging habitat. Ozark big-eared bats do forage in forest openings or along habitat edges, indicating that habitat fragmentation may provide some potential benefit (ODWC 2011).

However, they also tend to avoid areas of human development, croplands, and orchards (Boyles, Timpone, and Robbins 2009). Thus, habitat fragmentation may negatively and/or positively impact Ozark big-eared bats, depending on site-specific circumstances.

Disease and predation are not considered major threats to the continued existence of Ozark big-eared bats (Stark 2008). White-nose syndrome has not been identified in Ozark big-eared bats, despite populations of many species of hibernating bats in the United State having been affected by this disease (WNSO 2014). Similarly, collisions with wind turbines have not been identified as a major threat to Ozark big-eared bats; however, no wind farms have been developed within their range (USGS 2014).

5.24.4 Potential Presence in the Action Area

Definition of the Action Area

Ozark big-eared bats are not migratory and have small home ranges (Boyles, Timpone, and Robbins 2009; Graening et al. 2011). The largest tracked movement of an Ozark big-eared bat is approximately 4.5 miles (7.3 kilometers), although the typical foraging distance is within 1.25 miles (2 kilometers) from the roost (Graening et al. 2011). As such, Ozark big-eared bat home ranges may potentially overlap the Project if occupied caves occur within 4.5 miles of the Project. It stands to reason that Ozark big-eared bats that roost or hibernate in caves within 4.5 miles of the Project may be directly or indirectly impacted; therefore, the Action Area for Ozark big-eared bats is considered to be the project disturbance footprint plus a 4.5-mile buffer where potentially suitable foraging habitat, maternity colonies, hibernacula, or other roosts are traversed by the Project within the Ozark big-eared bat's known range. This 4.5-mile Action Area buffer is expected to encompass all potential Project impacts on Ozark big-eared bats. The Project surveyed for potential karst/cave features within a 300-foot corridor along the HVDC transmission line route in the summer of 2014 (see "Additional Desktop/Field Analyses" below). The identification of potential Ozark big-eared bat caves in the Action Area is limited to the results of this field effort and existing, publicly available data.

Presence in the Action Area Based on Existing Data

Ozark big-eared bats are known to or believed to occur in the following counties proposed to be traversed by the Project: (Oklahoma) Sequoyah; (Arkansas) Crawford, Franklin, Johnson, and Pope (Figure 5.24-1, "Potential Presence of Ozark Big-eared Bat in the Action Area") (USFWS 2014a, 2014b). Twenty caves are considered essential to Ozark big-eared bats in Oklahoma (12) and Arkansas (8)(Stark 2008). The exact locations of these caves are confidential; therefore, the number of essential caves located in Project counties is unknown at this time. On January 13, 2015, the Arkansas Game and Fish Commission located a cave occupied by Ozark big-eared bats and two additional species, the tricolored bat and big brown bat, in Crawford County, Arkansas (Sasse 2015). The cave lies within the proposed project disturbance footprint and is situated between two potential tower locations. Based on the data collected, this cave is considered an occupied winter hibernacula for the Ozark big-eared bat.

Clean Line reviewed publically available land cover data to evaluate the availability of Ozark big-eared bat foraging habitat in the Action Area (Jin et al. 2013). Ozark big-eared bats typically forage in forests and edge habitats (USFWS 2011). All forest types, regardless of size, shape, or composition, were identified during the review. Forest edge habitats were considered part of the forested land cover data in the Action Area. Table 5.24-1, "Potential Ozark Big-eared Bat Foraging Habitat Available in the Action Area," lists the potentially suitable foraging habitat available to Ozark big-eared bats in the Action Area. Forest habitats are categorized as deciduous, evergreen, and mixed, and are listed by total acres in each county in the Action area. Potential foraging habitat, according to Table 5.24-1, "Potential Ozark Big-eared Bat Foraging Habitat Available in the Action Area," is available in all counties in the Action Area.

Table 5.24-1
Potential Ozark Big-eared Bat Foraging Habitat Available in the Action Area

Location	Deciduous Forest (Acres)	Evergreen Forest (Acres)	Mixed Forest (Acres)	All Forests (Acres)
Arkansas				
Crawford	28,878.6	9987.2	5,071.2	43,937.0
Franklin	17,763.9	27034.2	8,390.4	53,188.5
Johnson	42,838.2	39535.7	8,841.2	91,215.1
Pope	40,924.0	46280.5	8,825.3	96,029.8
Oklahoma				
Sequoyah	88,660.7	1,870.4	2,552.3	93,083.4
Total	219,065.4	124,708.0	33,680.4	377,453.8

Source: Jin et al. (2013).

Additional Desktop/Field Analyses

Clean Line conducted surveys for subterranean features (i.e., caves, sinkholes, rock shelters, and other karst features) that may be used by threatened and endangered bats, including Ozark big-eared bats, as roosts and hibernacula in the summer and fall of 2014. The surveys were conducted along a 300-foot corridor centered on the HVDC transmission line route. In summary, 21 features were recorded in the Ozark big-eared bats range during these surveys, of which, five were determined to provide possible temporary bat roosting habitat. There were no karst features deep or large enough to support maternity colonies or hibernacula. The five potential temporary roosts were documented in two clusters, including a cluster of three features in Crawford County, Arkansas [redacted] and a cluster of two in Franklin County, Arkansas. Approximately 41 percent of the total Project study area was surveyed within the Ozark big-eared bats known range, as a lack of landowner permissions restricted access to the remaining areas. Refer to the "Bat Habitat Assessment of the Clean Line Plains & Eastern Transmission Line Project, Oklahoma, Arkansas, and Tennessee" in Appendix D and the "Re-Evaluation of Select Karst Features along the Plains & Eastern Clean Line Transmission Line Project, Oklahoma, Arkansas, and Tennessee" for full details on these survey efforts.

5.24.5 Direct and Indirect Impacts

Direct Mortality/Injury

Project construction could directly cause mortality or injury to Ozark big-eared bats if drilling or blasting occurs in close proximity to occupied hibernacula, maternity colonies, or other roosts in caves or mines. There were five karst features that may provide potential temporary bat roosts identified during summer and fall 2014 field surveys in Crawford and Franklin Counties in Arkansas. These features were primarily narrow vertical cracks and one shallow cave. However none of the features appeared to open into larger passages or cavities, or provide stable thermal conditions which would make them suitable as maternity colonies or hibernacula. In January 2015, the Arkansas Game and Fish Commission identified a cave within the project disturbance footprint that was occupied by hibernating Ozark big-eared bats (Sasse 2015). In addition, approximately 59 percent of the Project survey area in Ozark big-eared bat range was not surveyed for subterranean features due to land access constraints, so it is possible that additional maternity roosts or hibernacula occur in these unsurveyed areas (see

Appendix D and Appendix E). To avoid impacts on Ozark big-eared bat maternity caves, hibernacula, and other roosts, Clean Line will avoid and/or minimize construction within 300 feet of caves known to be occupied by the subspecies and will coordinate with the USFWS on seasonal or spatial restrictions to avoid or minimize potential impacts to sensitive areas during O&M. Clean Line will identify any potential Ozark big-eared bat caves or roosts in the currently unsurveyed areas of the Project prior to construction, as landowner access is obtained, and apply the same measures to any newly identified caves.

Mortalities and/or illness could also directly result from herbicide use for weed control, as well as fuel and other chemical spills, in any bat that comes in direct contact with the spill. Similarly, spills could cause mortality or illness indirectly if water or prey are contaminated. However, Clean Line would keep emergency and spill response equipment available during all Project activities so that, in the unlikely event that a spill was to occur, spills would be promptly contained, thus reducing potential adverse effects on Ozark big-eared bats (see GE-13 in Section 5.24.6.1, "Environmental Protection Measures").

Sensory Disturbance

Ozark big-eared bats could be disturbed by Project-related noise and vibrations during construction, operations and maintenance, and decommissioning, if activities occur in close proximity to occupied maternity colonies, hibernacula, or other roosts. Disturbance of hibernacula could cause bats to arouse and increase their metabolism, thus resulting in loss of energy reserves and decreasing survival. Maternity colonies may be susceptible to sensory disturbances from construction activities during summer months. Any disturbances to these colonies could negatively impact the health and survival of pups, and may also cause the maternity cave to be abandoned. Sensory disturbance impacts on Ozark big-eared bats would be short-term, lasting only as long as Project crews and equipment were in a given area, unless a maternity cave was abandoned. The abandonment of a maternity cave by Ozark big-eared bats could be a long term or permanent impact, if the bats do not re-colonize the site for a long period of time (if ever). Potential hibernacula and maternity colonies were not identified during Clean Line's 2014 field surveys; however, the five potential temporary bat roosts recorded in Crawford and Franklin Counties, Arkansas would be susceptible to sensory disturbance if occupied (see Appendix D and E). In January 2015, the Arkansas Game and Fish Commission identified a hibernaculum occupied by Ozark big-eared bats within the project disturbance footprint in Crawford County, Arkansas, that would also be susceptible to sensory disturbance (Sasse 2015). Furthermore, maternity colonies, hibernacula, and other roosts may be present in the remaining unsurveyed areas of the Project survey area in the Ozark big-eared bat's range. Clean Line will avoid and/or minimize construction activities within 300 feet of caves known to be occupied by Ozark big-eared bats to reduce sensory disturbance impacts on the subspecies and will coordinate with the USFWS on seasonal or spatial restrictions to avoid or minimize potential sensory disturbance during O&M (see FVW-6 and FVW-5 in Section 5.23.6.1, "Environmental Protection Measures"). Clean Line will identify potential Ozark big-eared bat caves or roosts in the currently unsurveyed areas of the Project prior to construction, as landowner access is obtained, and apply the same measures to any newly identified caves.

Research has indicated that bats may be more likely to avoid foraging in areas with intense, broadband background noise, such as traffic (Schaub, Ostwald, and Siemers 2008). As such, Project-related noise may degrade foraging habitats temporarily when Project activities occur in proximity. Potential Ozark big-eared bat foraging habitat is plentiful in all counties in the Action Area (see Table 5.24-1, "Potential Ozark Big-eared Bat Foraging Habitat Available in the Action Area"). That is, there are at least 43,000 acres of forests in each county in the Action Area, and almost 380,000 acres total (USGS 2012). Clean Line will restrict Project activities to daylight hours (see GE-20 in Section 5.24.6.1 "Environmental Protection Measures"), which would largely avoid Project-related noise impacts on foraging bats in the Action Area. Sensory disturbance impacts on Ozark big-eared bats would be short term, lasting only as long as Project crews and equipment were in a given area.

Habitat Loss/Alteration

Ozark big-eared bats may be indirectly impacted by fragmentation and removal of forest and woodland habitats during grading, clearing, and excavating activities. They may benefit from some habitat removal, as they do forage in forest openings and edge habitats (ODWC 2011; USFWS 2011). Still, negative impacts also are possible, as they also tend to avoid areas of anthropogenic development (Boyles, Timpone, and Robbins 2009). There are almost 380,000 acres of forested lands in the Action Area (USGS 2012). Potential impacts on this foraging habitat, beneficial or negative, are expected to be long term or permanent, as forests/woodlands would require more than 5 years to be restored to pre-construction conditions or would not be restored at all.

Several additional Project-related factors could result in habitat alteration and/or loss. Sensory disturbance associated with the increased presence of personnel and equipment during construction and decommissioning could cause Ozark big-eared bats to flee or avoid areas of temporary Project activity. This would effectively and indirectly amount to temporary habitat loss, although the associated impacts would be short term and would end when Project activities ceased, unless hibernacula or maternity caves were abandoned. Any sensory disturbance occurring during O&M activities, such as vegetation management within the ROW would be minimal, with activities only occurring for a short time, and is not expected to result in habitat loss. Abandonment of essential hibernation or maternity caves could be a long-term or permanent impact, depending how long, if ever, before Ozark big-eared bats re-colonize the caves. To avoid the potential for sensory disturbance to Ozark big-eared bats, Clean Line would avoid or minimize construction within 300 feet of occupied Ozark big-eared bat caves and will coordinate with the USFWS on seasonal or spatial restrictions to avoid or minimize potential impacts to sensitive areas during O&M (see FVW-6 and FVW-5 in Section 5.24.6.1, “Environmental Protection Measures”).

Spills and sediment from Project sources could contaminate the invertebrates on which Ozark big-eared bats may feed. In addition, fire associated with construction equipment and personnel could result in foraging habitat loss or alteration. The effects of spills and fires on habitat would result in indirect impacts on Ozark big-eared bats and would typically be short term; however, long-term impacts are possible, depending on the severity of the incident and response efforts. These impacts would be reduced by the implementation of protection measures (see Section 5.24.6, “Protection Measures”).

Increased Predation

Predators may also increase due to factors such as habitat alteration and trash. Trash created by Project personnel can attract known predators like raccoons (Stark 2008). Clean Line would practice good housekeeping to minimize the presence of trash from the Project during all phases of the Project (see Section 5.24.6.1, “Environmental Protection Measures”). Predation associated with Project activities is expected to have a negligible impact on Ozark big-eared bats, as Clean Line will properly dispose of trash during all phases of the Project and predation is not considered a notable threat to the subspecies.

5.24.6 Protection Measures

Clean Line has agreed to a number of measures to avoid or minimize impacts on Ozark big-eared bats. These measures include the Clean Line-designated EPMs outlined in Section 2.5, “Environmental Protection Measures,” and species-specific measures. Collectively, the EPMs and species-specific measures are referred to as “Protection Measures.”

5.24.6.1 Environmental Protection Measures

The following EPMs—general (GE) and fish, vegetation, and wildlife (FVW)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on Ozark big-eared bats.

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety, and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.
- (GE-20) – Clean Line will conduct construction and scheduled maintenance activities on the facilities during daylight hours, except in rare circumstances that may include, for example, to address emergency or unsafe situations, to avoid adverse environmental effects, to minimize traffic disruptions, or to comply with regulatory or permit requirements.
- (GE-21) – Clean Line will maintain construction equipment in good working order.
- (GE-25) – Clean Line will turn off idling equipment when not in use.

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.
- (FVW-6) – Clean Line will avoid and/or minimize construction within 300 feet of caves known to be occupied by threatened or endangered species.

5.24.6.2 Species-specific Measures

Clean Line has developed EPMs to avoid or minimize disturbances to caves occupied by ESA-listed species (e.g., Ozark big-eared bats; see FVW-6 in Section 5.24.6.1, "Environmental Protection Measures") during construction of the Project. Furthermore, Clean Line has committed to minimizing impacts on environmentally sensitive vegetation (FVW-1) and reducing construction-related impacts during important time periods like maternity or hibernation (FVW-5). Further, measures to be implemented by Clean Line to avoid or minimize impacts on other ESA-listed bat species (e.g., Indiana bats) will also benefit Ozark big-eared bats. As such, Clean Line proposes to rely on their EPMs and their commitment to species-specific measures for other bat species to minimize potential Project impacts on Ozark big-eared bats.

5.24.7 Effects Determination

Potential Ozark big-eared bat foraging habitat is common throughout the Action Area (see Table 5.24-1, "Potential Ozark Big-eared Bat Foraging Habitat Available in the Action Area"), and would be subject to impacts where Project activities occur in and adjacent to these areas. The loss and fragmentation of foraging habitat for human development is another primary threat to the Ozark big-eared bat, as they tend to avoid areas of human development (Boyles, Timpone, and Robbins 2009). Clean Line has committed to minimizing the clearing of vegetation in the ROW and to avoiding or minimizing impacts on environmentally sensitive vegetation (see GE-3 and FVW-1 in Section 5.24.6.1 "Environmental Protection Measures"). Similarly, Clean Line will limit Project activities to daylight hours (GE-20), which would reduce the likelihood that noise diminishes the quality of foraging habitats for bats as they forage at night. Finally, the environmental protection measures detailed in Section 5.24.6, "Protection Measures," indicate that Clean Line will practice good housekeeping to prevent attracting predators or causing fires.

One of the primary threats to Ozark big-eared bats is human disturbance of occupied hibernacula and maternity roosts (Graening et al. 2011; ODWC 2011; USFWS 2011). In January 2015, the Arkansas Game and Fish Commission identified a hibernaculum occupied by Ozark big-eared bats within the proposed project disturbance footprint (Sasse 2015). The hibernaculum is situated between two potential tower locations in Crawford County, Arkansas. Field studies conducted by Clean Line have not revealed any additional subterranean features potentially supporting Ozark big-eared bat hibernation or maternity roosts occurring along a 300-foot study corridor centered on the Project's HVDC transmission line (see Section 5.24.4 "Potential Presence in the Action Area"). However, approximately 59 percent of the study corridor was not surveyed due to access restrictions. Clean Line will identify additional potential Ozark big-eared bat caves in unsurveyed areas prior to construction, as land access is granted. Clean Line is committed to avoiding or minimizing construction activities within 300 feet of occupied caves and will coordinate with the USFWS on seasonal or spatial restrictions to avoid or minimize potential impacts to sensitive areas during O&M, but with a known hibernaculum in the project disturbance footprint, the potential for additional hibernacula or roost sites in the remaining unsurveyed areas, and the difficulty of detecting all occupied caves in the Action Area, the Project may not be able to completely avoid all disturbance to Ozark big-eared bats.

The implementation of the aforementioned protection measures would minimize most of the impacts on Ozark big-eared bat hibernacula and foraging habitats. Despite these efforts to reduce impacts on the subspecies, an occupied hibernaculum was identified in the Project disturbance footprint and 59 percent of the study corridor has not yet been surveyed. The potential impacts on Ozark big-eared bats through disturbances of cave hibernacula, maternity colonies, and other roosts are not discountable or insignificant, even though Clean Line will avoid and/or minimize construction activities within 300 feet of occupied caves (see FVW-6 in Section 5.24.6.1 "Environmental Protection Measures"). Clean Line will conduct pre-construction surveys to determine the presence or likely absence of Ozark big-eared bats in known and potentially suitable caves; however, this information will not be available for most of the survey area prior to the completion of the Biological Assessment, so Clean Line must assume that any potentially suitable caves in unsurveyed areas, in addition to the known Ozark big-eared bat hibernacula, are occupied. For these reasons, the Project "may affect, and is likely to adversely affect" the Ozark big-eared bat.

Critical habitat has not been designated for the Ozark big-eared bat; therefore, the Project "will not destroy or adversely modify" critical habitat for the subspecies.

5.24.8 Cumulative Effects

The cumulative effects of non-Project-related future activities on Ozark big-eared bats are described below, which is a discussion necessitated by the fact that Ozark big-eared bats are likely to be adversely affected by the Project. This section considers future state, local, tribal, and private actions, not involving federal activities, that are reasonably certain to occur within the Ozark big-eared bat Action Area.

The following activities have been identified as reasonably certain to occur within the Ozark big-eared bat Action Area:

- ***SH-10A in Muskogee and Sequoyah Counties, Oklahoma.*** ODOT (2013) plans to grade, drain, and surface the stretch of SH-10A that runs between SH-10 and SH-100. At the closest point, the Project disturbance footprint lies about 1.7 miles southwest of this planned activity. This activity may result potential impacts on Ozark big-eared bats associated with temporary disturbances from crews and equipment in the Action Area during construction.
- ***I-40 near its Junction with SH-82, Sequoyah County, Oklahoma.*** ODOT (2013) plans two activities along this section of I-40, including a bridge and approach activity over Vian and Little Vian Creeks, and 6 miles of pavement rehabilitation. At the closest point, the Project disturbance footprint lies about 1.5 miles northeast of this section of I-40. These activities may result in some vegetation clearing/maintenance, but potential impacts on Ozark big-eared bats in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.
- ***I-40 along the South Side of Sallisaw, Sequoyah County, Oklahoma.*** ODOT (2013) plans multiple activities along this section of the highway, including 5 miles of pavement rehabilitation, a bridge and approach over Big Sallisaw Creek, a bridge and approach over a county road and railroad, and the I-40/US-64 interchange. This section of I-40 is between 3 and 3.5 miles south of the Project disturbance footprint. These activities may result in some vegetation clearing/maintenance, but potential impacts on Ozark big-eared bats in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.
- ***US-64 West of Sallisaw, Sequoyah County, Oklahoma.*** ODOT (2013) plans bridge and approaches activity at Big Sallisaw Creek. The location is about 2.4 miles south of the Project disturbance footprint. This activity may result in some vegetation clearing/maintenance, but potential impacts on Ozark big-eared bats in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.
- ***US-59 in Sallisaw, Sequoyah County, Oklahoma.*** ODOT (2013) plans to grade, drain, and surface 3.5 miles of US-59, north from its intersection with US-64. The Project disturbance footprint would traverse the highway location at about 2.6 miles north of US-64. This activity may result potential impacts on Ozark big-eared bats associated with temporary disturbances from crews and equipment in the Action Area during construction.

- ***SH-101 East of Sallisaw, Sequoyah County, Oklahoma.*** ODOT (2013) plans bridge and approaches activity at an unnamed creek that is about 0.6 miles north of the Project disturbance footprint. This activity may result in some vegetation clearing/maintenance, but potential impacts on Ozark big-eared bats in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.
- ***AHTD District 4, Crawford County, Arkansas.*** The AHTD (2012, 2014a) has plans for programmed work on I-40 from the Oklahoma-Arkansas state line to an area west of Dyer, and has plans for new construction of US-71 from Alma south to an area east of Kibler, and to the Arkansas River southeast of Fort Smith. The Project disturbance footprint would traverse the both of these activity segments. The new construction activities may require in some vegetation clearing/maintenance, which may result in impacts on Ozark big-eared bats and suitable habitat. Similarly, potential impacts on Ozark big-eared bats in the Action Area may also occur during construction for the I-40 work and new construction and would largely be associated with temporary disturbances from crews and equipment.
- ***AHTD District 4, Franklin County, Arkansas.*** The AHTD (2014a) has plans for programmed road work on SH-23 that begins over 4 miles to the north of the Project disturbance footprint and then extends northward. This activity may result in some vegetation clearing/maintenance, but potential impacts on Ozark big-eared bats in the Action Area would largely be associated with temporary disturbances from crews and equipment present during construction.
- ***AHTD District 8, Pope County, Arkansas.*** The AHTD (2014b) has plans for programmed road work on a short segment of SH-27 about 2.4 miles to the north of the Project disturbance footprint. The AHTD has also announced plans to construct a Highway 7 bypass to the west of Dover (Crabtree 2013). At the closest point, the Project disturbance footprint lies about 3 miles to the north of the Highway 7 bypass. The new bypass construction activities may require in some vegetation clearing/maintenance, which may result in impacts on Ozark big-eared bats and suitable habitat. Similarly, potential impacts on Ozark big-eared bats in the Action Area may also occur during construction for the SH-27 work and new bypass construction and would largely be associated with temporary disturbances from crews and equipment.

5.25 Interior Least Tern

The USFWS listed the interior population of the least tern (*Sternula antillarum athalassos*), hereafter the interior least tern (ILT), as endangered on May 28, 1985 (USFWS 1985). Critical habitat has not been designated for the ILT.

5.25.1 Natural History

Range

There are two distinct coastal and one interior breeding population of the least tern in the United States (Thompson et al. 1997). The Atlantic population (*S. a. antillarum*) breeds along the Atlantic and Gulf Coasts, and the California population (*S. a. browni*) breeds along the coast of California. The ILT breeds locally along major river systems in the central United States from Indiana and Kentucky west to eastern portions of Montana, Colorado, and New Mexico, and from North Dakota south to Louisiana and Texas (USFWS 1994; Thompson et al. 1997; Lott 2006; Tern & Plover Conservation Partnership 2013). Breeding colonies are scattered along the Ohio, Mississippi, Missouri, Red, and Rio Grande river systems, but also occur at reservoirs, lakes, and National Wildlife Refuges. In Oklahoma, breeding areas are located along the Arkansas, Cimarron, Red, and South Canadian Rivers, as well as Optima Lake in Texas County (Thompson et al. 1997; Tern & Plover Conservation Partnership 2013). In Arkansas, the ILT breeds along the Arkansas and Mississippi Rivers. It also breeds along the Mississippi River in Tennessee.

Least terns are migratory birds that winter primarily in marine coastal areas along the eastern coasts of Mexico, Central American, and South America (USFWS 1994; Thompson et al. 1997; Tern & Plover Conservation Partnership 2013). They rarely winter as far north as the Gulf Coast of the United States (Thompson et al. 1997). It is not known exactly where the ILT spends the winters compared with the Atlantic and Gulf Coast breeding populations. During migration to and from breeding grounds, the ILT is believed to follow major river systems to the confluence of the Mississippi River and then south to the Gulf of Mexico before following coastlines to their wintering grounds (Thompson et al. 1997; Tern & Plover Conservation Partnership 2013). Salt Plains NWR in Alfalfa County, Oklahoma, is considered an important post-nesting staging area for the ILT; however, staging sites along rivers are more unpredictable.

Breeding Ecology

The ILT arrive at their breeding grounds between late April and early June (Sidle and Harrison 1990; Thompson et al. 1997). Pairs form soon after arrival, but nesting may be delayed until flood waters have receded and sufficient suitable habitat is exposed (Thompson et al. 1997). The ILT nests in colonies on bare or sparsely vegetated sand or dried mud along rivers, reservoirs, lakes, and salt flats (Thompson et al. 1997; Lott 2006; Tern & Plover Conservation Partnership 2013). They are increasingly using human-modified nesting locations such as sand/gravel pits, gravel rooftops, and industrial sites in proximity to water in areas where natural nesting habitat has been altered or removed (Sidle and Harrison 1990; Thompson et al. 1997). Nesting sites are generally ephemeral due to seasonal water level fluctuations, which changes the availability of habitat from year to year (Thompson et al. 1997). ILTs do exhibit nesting site fidelity and will return to previously used nesting areas. Nest colony site fidelity may be influenced by changes in vegetation cover, predators, human activities, floods, and colony size.

Least terns typically lay two or three eggs in a shallow, cup-like depression in the substrate (Sidle and Harrison 1990; Thompson et al. 1997; Tern & Plover Conservation Partnership 2013). Both parents take turns incubating the nest for 19 to 25 days, although the females generally spend more time incubating than do males. The ILT may re-nest if their original nest fails or if chicks are lost early enough in the breeding season (Thompson et al. 1997; Tern & Plover Conservation Partnership 2013). Upon hatching, chicks are brooded for the first day or two and then begin to seek shelter and thermo-regulate themselves (Sidle and Harrison 1990; Thompson et al. 1997; Tern & Plover Conservation Partnership 2013). The chicks generally stay close to the nest early in their development, but wander farther away from the nest as they mature. Chicks fledge at about three weeks of age, but will continue to receive parental care until the fall migration (Sidle and Harrison 1990; Thompson et al. 1997; Tern & Plover Conservation Partnership 2013).

Reproductive success varies greatly both annually and among colonies (Sidle and Harrison 1990; Thompson et al. 1997). ILTs are susceptible to frequent nest and chick loss due to the ephemeral nature of their nesting habitats (Sidle and Harrison 1990). Annual productivity of ILT was estimated at roughly 0.5 fledglings per pair regionally between 1982 and 1992 (Thompson et al. 1997).

Migration Ecology

ILTs depart their breeding colonies within four to eight weeks from chicks fledging (Thompson et al. 1997). The timing of migration depends on nesting completion and generally occurs from late July into September, although migration has been noted as early as late June and as late as October (Thompson et al. 1997; Tern & Plover Conservation Partnership 2013). In the weeks leading up to the fall migration, adults and juveniles congregate at productive foraging spots. Once migration commences, they may travel in small, loose flocks and will feed and rest along major rivers en route to their winter destination. During post-breeding and fall migration, least terns have been observed in aquatic habitats throughout most of the United States. Migration to breeding sites in the spring is likely more rapid than the fall migration to wintering sites, and occurs from mid-March through early June (Sidle and Harrison 1990; Thompson et al. 1997).

Flight Behavior

ILTs are strong, agile, direct flyers that use aerobatic maneuvers when foraging and responding to disturbances (Thompson et al. 1997; Tern & Plover Conservation Partnership 2013). When foraging, they hover over shallow water and dive for fish. They also swoop and dive at intruders in their nesting colonies (Thompson et al. 1997). During pair formation, ILTs engage in aerial courtship displays that involve a series of chases and aerial maneuvers with other terns (Thompson et al. 1997; Dinan, Jorgensen, and Bomberger Brown 2012). Strong winds can impair their otherwise strong flying abilities (Thompson et al. 1997).

5.25.2 Population Status

The range-wide distribution and abundance of the ILT was poorly understood prior to the subspecies' listing in 1985 (Thompson et al. 1997; Lott 2006). Survey coverage has steadily increased since that time; however, the ephemeral nature of their nesting colonies, incomplete survey coverage, and poor data management made it difficult to evaluate range-wide population size and trends. The best available information suggested that ILT populations increased from an estimated 4,125 to 6,830 individuals from 1986 to 1991, although these numbers are probably underestimated (Thompson et al. 1997). The Interior Least Tern Working Group conducted a range-wide survey of the population in 2005 (Lott 2006). The survey effort estimated a total of 17,591 individuals (~7,000 pairs) in association with 489 colonies across their range. In the Arkansas River system, the 2005 range-wide effort estimated 2,129 individuals across 126 colonies (see Table 5.25-1, "2005 Count Totals for the Arkansas River System with Comparative Historic Data from 1986 to 2004"). An estimated 10,960 individuals across 87 colonies were recorded along the Mississippi River between Cape Girardeau, Missouri and Baton Rouge, Louisiana.

The USACE Memphis District has performed annual surveys of nesting ILTs between Cape Girardeau and Baton Rouge on the Mississippi River since 1985 (Jones 2012). The most recent available survey results reported 10,090 individuals across 75 nesting colonies in July 2012. According to the 2012 survey results, the nearest recorded colony "Cedar Point" lies about 2.5 miles south of the Project crossing of the Mississippi River. Forty-two adults were counted at this colony in 2012. The "Cedar Point" colony has nested on this sandbar as close as about 1 mile to the south of the Project, but has typically been recorded between 2 and 3 miles south since 2008 (Jones 2003, 2005-2012). Twenty adult ILTs were recorded at "Below Richardson Landing Dikes," which is the closest colony to the north of the Project crossing of the Mississippi River (about 3 miles) (Jones 2012). This colony has remained at least 2 miles north of the Project since 2003 (Jones 2003, 2005-2012).

Table 5.25-1
2005 Count Totals for the Arkansas River System with Comparative Historic Data from 1986 to 2004

Arkansas River System	2005 Survey	
	Number of Adults	Number of Colonies
"Upper" Arkansas Valley Reservoirs, CO	44	6
Quivira NWR, KS	40	2
Arkansas River near Wichita, KS	12	1
Arkansas River, Kaw Dam to Keystone Lake, OK	104	3
Arkansas River, Keystone Dam to Muskogee, OK	496	16
Arkansas River, McKlellen-Kerr Arkansas Navigation System, AR	319	11
Subtotal, Arkansas River	1,015	39
Salt Plains NWR, OK	90	8
Cimarron Salt Flats (2), OK	242	2
Cimarron River, OK (Crooked Creek to Keystone Lake)	186	27
North Canadian River, OK	6	1
"Upper" Canadian River, TX- OK (Canadian, TX to Eufaula Lake)	342	46
"Upper" Canadian River mouth at Eufaula Lake, OK	130	1
"Lower" Canadian River, east of Eufaula Lake, OK	118	2
Total, Arkansas River System	2,129	126

Source: Lott 2006.

5.25.3 Current Threats

Least terns (all populations) suffered precipitous declines in the nineteenth and early twentieth centuries due to millinery trade and egg collection but rebounded after the enactment of the Migratory Bird Treaty Act of 1918 (Thompson et al. 1997). ILT populations began declining again and their distribution became more fragmented between the 1940s and 1970s, primarily because of the construction and operation of dams and channelization of rivers, which have reduced the availability of sandbars and islands used as nesting habitat (USFWS 1994; Thompson et al. 1997). Human activities (e.g., boats, off-road vehicles, construction, recreation) at or near roosting, foraging, or nesting sites also are a threat, and such disturbances may reduce reproductive success and individual fitness.

Contaminants also pose a threat if spills occur in suitable habitats (Thompson et al. 1997). ILTs may also be negatively affected by the bioaccumulation of contaminants from the fish they consume. Finally, predation is another notable threat to ILT survival, primarily at nesting sites. A number of bird and mammal species are potential predators of adults, chicks, and eggs, including but not limited to owls, crows, skunks, raccoons, coyotes, dogs, cats, and humans (Thompson et al. 1997; Tern & Plover Conservation Partnership 2013). An efficient predator can eliminate most productivity at a nesting site within a given year (Thompson et al. 1997).

5.25.4 Potential Presence in the Action Area

Definition of the Action Area

The ILT Action Area has been defined as the project disturbance footprint, which includes the 200-foot HVDC ROW plus an additional 0.25-mile buffer from the edge of the project disturbance footprint. The 0.25-mile Action Area would be applied to the entire Project, as ILT may occur at any open-water, aquatic habitat during spring and fall migration (Thompson et al. 1997). Use of a 0.25-mile buffer in addition to the project disturbance footprint is intended to ensure that the Action Area has been sufficiently scoped to analyze all potential direct and indirect impacts. Further, the application of a 0.25-mile buffer is consistent with identified buffers for the ILT on other projects in the region (Oklahoma Department of Transportation [ODOT] 2012; USFWS 2013a). As the Action Area applies to the entire Project, this analysis will not only cover the potential impacts on migratory corridors (such as rivers) but will also include the nesting and foraging habitat that may occur along the Proposed Route.

Presence in the Action Area Based on Existing Data

ILTs have been documented in all counties traversed by the Project in Oklahoma (USFWS 2014a). The Project would traverse two rivers in Oklahoma (Cimarron and Arkansas) on which breeding colonies have been documented (see Figure 5.25-1, "Potential Presence of Interior Least Tern in the Action Area") (Lott 2006). The Project is expected to traverse suitable habitat along the Cimarron River in Major and Payne Counties (USFWS 2013b). [redacted] Lott (2006) identified 29 breeding colonies on the Cimarron River in 2005 comprising 428 adult ILTs (see Table 5.25-1, "2005 Count Totals for the Arkansas River System with Comparative Historic Data from 1986 to 2004"). The Project would traverse the Arkansas River in Muskogee County, Oklahoma. [redacted] eBird (2014) data indicate that breeding ILT occur at Sequoyah NWR near the confluence of the Arkansas and Canadian Rivers, approximately 10 miles downstream of the Project crossing. There are no known breeding colonies within several miles of the Project crossing of the Arkansas River, and Lott (2006) labels this stretch of the river as a "navigation system with no ILT" based on 2005 range-wide surveys.

The USFWS (2014a) has identified the following as counties traversed by the Project in Arkansas where ILTs are known to or believed to occur: Crawford, Franklin, Pope, Conway, Faulkner, Cross, and Mississippi. In addition, eBird (2014) observations of ILTs have been reported in Van Buren, White, and Poinsett Counties, which includes sightings submitted by the Arkansas Audubon Society in Van Buren and White Counties. The Project does not cross any rivers in Arkansas with known breeding populations of ILTs; however, it does traverse the Mississippi River between Arkansas and Tennessee.

This crossing occurs within a segment of the Mississippi River (from Cape Girardeaux, Missouri, to Baton Rouge, Louisiana) that harbors the largest population of nesting ILTs, according to the 2005 range-wide ILT census (Lott 2006). Breeding ILTs have been documented in proximity to the Project crossing of the Mississippi River (Jones 2003, 2005-2012; USFWS 2014b). In 2012, colonies were documented about 3 miles and 2.5 miles to the north and south of the Project crossing, respectively (Jones 2012).These colonies are on sandbars that may be 0.25 miles from the crossing at their closest points, although this distance may vary given the continually changing nature of sandbars. During migration, ILTs are possible in nearly all aquatic habitats within the Action Area, although they are more likely to occur along the major rivers previously mentioned. Spring migration observations of ILT in Oklahoma, Arkansas, and the Memphis-area of Tennessee are limited to the month of May, while fall migration observations were recorded between late July and mid-September (eBird 2014).

Additional Desktop/Field Analyses

Additional desktop and/or field analyses were not conducted, as ILT breeding colonies in the Project vicinity are well documented and sufficient information was available to inform this document.

5.25.5 Direct and Indirect Impacts

Direct Mortality/Injury

Injuries and/or mortalities could occur as a direct result of Project activities. ILTs are generally very mobile and would be able to avoid Project equipment. Eggs and young birds would be more susceptible to direct mortality or injury by equipment during the breeding season. Mortalities and injuries to eggs and chicks could also occur because of Project personnel foot traffic. Adults may suffer direct mortality or injury while defending their nests or young. Similarly, collisions with vehicles traveling along access roads or Project ROWs could cause mortalities and/or injuries. Wildlife mortalities and/or injuries could also directly result from herbicide used for weed control, as well as fuel or other chemical spills, if birds come in direct contact with the contaminant or indirectly if their food sources are contaminated. Mortalities associated with Project personnel, vehicles, and construction equipment are not expected to occur, as the Project will avoid ground disturbance in potential suitable nesting and stopover habitat along the Cimarron, Arkansas, and Mississippi Rivers.

ILT collisions with power lines are possible during operations and maintenance of the Project; however, the risk of collision is expected to be minimal. The ILT is a small-bodied species and a strong, agile flyer, making it able to readily avoid collisions with power lines. Furthermore, it is diurnally active, rendering it less susceptible to collisions than birds that fly at night (Thompson et al. 1997; APLIC 2012; Dinan, Jorgensen, and Bomberger Brown 2012). In fact, there is only one record of an ILT mortality attributed to a power line collision (Dinan, Jorgensen, and Bomberger Brown 2012).

The single documented ILT mortality occurred at a site where a power line crossed a river (Lower Platte River, Nebraska) and a large midstream sandbar with a tern colony of approximately 30 adults (Dinan, Jorgensen, and Bomberger Brown 2012). However, the location of the power line in this study was sited directly over a breeding colony that may have increased the risk of ILT collisions. The Project is not proposed to cross a large midstream sandbar or a known nesting site in the Mississippi River. According the USACE Memphis District annual ILT survey results, the nearest recorded colonies were about 3 miles and 2.5 miles to the north and south of the Project crossing, respectively, during the most recent survey in 2012 (Jones 2012). Since 2003, the closest colonies have been recorded to the proposed Project crossing of the Mississippi River was about 1 mile to the south and 2 miles to the north (Jones 2003, 2005-2012). Dinan, Jorgensen, and Bomberger Brown (2012) suggest that ILT-power line collisions are possible, but rare.

Henderson, Langston, and Clark (1996) conducted a study of the response of common terns (*Sterna hirundo*) to power lines at a site in the United Kingdom. Common terns are a larger, but still relatively small relative of the ILT, with similar life history and habits. In this study, a colony of approximately 200 pairs of terns regularly traveled about 3 miles between their nesting and foraging sites, traversing two power lines in the process. Both power lines were within 320 to 650 feet from the nesting colony at their closest points. Henderson, Langston, and Clark (1996) found that mortalities were "rare" despite the high potential for collision due to the placement of the lines and an estimated 180,000 passes undertaken by the colony each season. Furthermore, the authors suggest that power lines have little impact on the mortality of agile, diurnally active flying birds.

Mortalities and injuries resulting from power line collisions would be considered long term (or permanent relative to the life of the Project) impacts on the ILT. The magnitude of the impacts would be dependent on two factors, including the implementation of protection measures (see Section 5.25.6, "Protection Measures") to reduce collisions and the numbers of collisions occurring. Commonly adopted measures such as transmission line markings recommended by the APLIC can further reduce collision risk. Interior least tern collisions with the Project would be highly unlikely, as ILT are believed to rarely collide with power lines in areas where power lines overlap ILT breeding colonies (Dinan, Jorgensen, and Bomberger Brown 2012). The Project has been sited to avoid known ILT breeding colonies and there are no known ILT breeding colonies within the Action Area. Nesting sites are generally ephemeral due to seasonal water level fluctuations and shifting of sandbars, which changes the availability of habitat from year to year (Thompson et al. 1997). The USACE Memphis District annual ILT surveys of the Mississippi River indicate that while ILT colonies shift from year to year, breeding populations have not occurred within 1 mile of the Project's proposed Mississippi River crossing and typically breed more than 2 miles away (Jones 2003, 2005-2012). Likewise, there are no documented occurrences of ILTs less than 0.5 miles from proposed Project crossings on rivers in Oklahoma (Oklahoma Biological Survey 2011; Oklahoma Natural Heritage Inventory 2013). The potential for ILT collisions with the Project is highly unlikely and is reduced further by the measures that would be implemented by the Project.

Sensory Disturbance

Direct impacts from sensory disturbances also are possible, as noise, vibrations, and human presence from Project activities could cause displacement or avoidance of areas, or nest abandonment by breeding adults (Thompson et al. 1997). Sensory disturbances can cause stress, displacement, or avoidance behavior resulting in disruptions in essential activities such as foraging, reproduction, and parental care. As a result, adults and their young may exhibit a reduction in overall fitness, and may be more susceptible to illness and predation. The fitness of nesting colonies may be at risk if disturbances impact a relatively large number of individuals and/or occur over a relatively long period of time. Project-related sensory disturbance impacts are expected to be intermittent and short term, occurring during work hours and ceasing after Project activities have moved from the vicinity of ILT nesting, roosting, and foraging areas. The Project will be sited to avoid impacting potential nesting colonies along the Cimarron, Arkansas, and Mississippi Rivers to the extent practicable. In the unlikely event that Project activities must occur in the vicinity (i.e., within 0.25 miles) of active nesting colonies, the Project will consult with USFWS, and as necessary, conduct those activities outside of the breeding season. The siting efforts, in combination with implementing protection measures (see Section 5.25.6, "Protection Measures"), are expected to result in minimal impacts associated with sensory disturbance on ILTs.

Habitat Loss/Alteration

Alteration or removal of potential nesting or migration stopover habitat by the Project would negatively and indirectly affect ILTs (USFWS 1994; Thompson et al. 1997). Habitat alteration may limit potential nesting opportunities near the Project, and could reduce foraging habitat for migrating and breeding birds. The presence of permanent structures and sensory disturbances from Project personnel and equipment in close proximity to nesting habitat could preclude the ILT from using this habitat (USFWS 2013b). Impacts related to habitat loss or alterations are not expected to occur, as the Project will avoid ground disturbance in potential suitable nesting habitat along the Cimarron, Arkansas, and Mississippi Rivers. Similarly, disturbance of nesting habitat due to the presence of Project personnel and equipment and permanent structures will likely be avoided or substantially reduced by the Project's efforts to site Project facilities away from potential nesting habitat.

Increased Predation

Predation of ILTs could increase indirectly as a result of several elements of the Project. Power lines and structures can provide hunting perches for corvids and raptors, particularly in open habitats where very few elevated perches exist (Lammers and Collopy 2007). Perching on structures is believed to increase hunting efficiency by avian predators due to the increased visibility of the surrounding area. Predation associated with perching on anthropogenic structures could begin with the construction phase of the Project; however, this impact would be expected to be greater during the operations and maintenance phase, as the full HVDC line and AC lines would be constructed and potentially provide perches for the life of the Project. Known avian predators of ILT that may benefit from these artificial perches include but are not limited to American kestrels (*Falco sparverius*), loggerhead shrike (*Lanus ludovicianus*), American crow, and fish crow (*Corvus ossifragus*) (Thompson et al. 1997; Tern & Plover Conservation Partnership 2013).

Predators may also increase indirectly due to trash from Project personnel. Trash could attract predators, including, but not limited to, gulls, crows, and raccoons, which could take adults, young, and/or eggs. This would be a short-term impact that would end with the removal of the trash source. Clean Line will practice good housekeeping during Project activities and train personnel in environmental matters (see GE-1 and GE-15 in Section 5.25.6.1, "Environmental Protection Measures") to avoid the disposal of trash in Project areas; therefore, trash-related increases in predation on ILTs are not expected to occur.

5.25.6 Protection Measures

Clean Line has agreed to a number of measures to avoid or minimize impacts on ILTs. These measures include the Clean Line-designated EPMs outlined in Section 2.5, "Environmental Protection Measures," and species-specific measures. Collectively, the EPMs and species-specific measures are referred to as "Protection Measures."

5.25.6.1 Environmental Protection Measures

The following EPMs—general (GE); fish, vegetation, and wildlife (FVW); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on ILTs.

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety, and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits
- (GE-2) – Clean Line will design, construct, maintain, and operate the Project following current APLIC guidelines to minimize risk of avian mortality.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.

- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies, and groundwater wells, or as otherwise required by federal, state, or local regulations.
- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.
- (GE-20) – Clean Line will conduct construction and scheduled maintenance activities on the facilities during daylight hours, except in rare circumstances that may include, for example, to address emergency or unsafe situations, to avoid adverse environmental effects, to minimize traffic disruptions, or to comply with regulatory or permit requirements.
- (GE-21) – Clean Line will maintain construction equipment in good working order. Equipment and vehicles that show excessive emissions of exhaust gasses and particulates due to poor engine adjustments or other inefficient operating conditions will be repaired or adjusted.
- (GE-22) – Clean Line will impose speed limits during construction for access roads (e.g., to reduce dust emissions, for safety reasons, and for protection of wildlife).

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-2) – Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-4) – If construction- and/or decommissioning-related activities occur during the migratory bird breeding season, Clean Line will work with USFWS to identify migratory species of concern and conduct pre-construction surveys for active nests for such species. Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other

resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.

Waters, Wetlands, and Floodplains EPMs:

- (W-2) – Clean Line will identify, avoid, and/or minimize adverse effects to wetlands and waterbodies. Clean Line will not place structure foundations within the OHWM of Waters of the United States.
- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.
- (W-7) – Clean Line will locate spoil piles from foundation excavations and fiber optic cable trenches outside of streamside management zones.
- (W-9) – Clean Line will design converter station sites to avoid adverse changes to the base flood elevation within the 100-year floodplain.
- (W-10) – Clean Line will minimize fill for access roads and structure foundations within 100-year floodplains to avoid adverse changes to the base flood elevation.

5.25.6.2 Species-specific Measures

In addition to the abovementioned EPMs, Clean Line will adhere to the species-specific measures below. These measures have been identified to avoid or minimize impacts on ILTs during construction for other linear projects in the ILT's range (ODOT 2012; USFWS 2013a).

- Clean Line will conduct pre-construction surveys within 0.25 miles from suitable breeding habitat at the Cimarron River in Oklahoma, and the Mississippi River in Arkansas and Tennessee during the nesting season (from May 1 through August 31) to ensure that there are no nesting terns within 0.25 miles of the construction area. Daily surveys for nesting ILT would be conducted during the nesting season when construction activities occur within 0.25 miles of potential nesting habitat.
- If ILT nests are found at the crossings, then Clean Line would: 1) adhere to the 0.25-mile buffer of no construction activity and 2) continue to monitor nests if any are within 0.25 miles of the construction footprint until young have fledged.
- Clean Line will install bird flight diverters on the shield wire on the line span between the banks at the Cimarron and Mississippi River crossings.
- If the ILT is observed at or near the Project site prior to or during construction, Clean Line will immediately contact the USFWS and other appropriate natural resource agencies.

5.25.7 Effects Determination

The Project will avoid areas of potential ILT nesting colonies and potential nesting habitat along the Cimarron and Mississippi Rivers. Nesting sites are generally ephemeral due to seasonal water level fluctuations and shifting of sandbars; however, existing data, including annual surveys conducted on the Mississippi River by the USACE Memphis District, reveal that ILT nesting colonies have not been documented less than 0.5 and 1 miles from proposed Project crossings on the Cimarron and Mississippi Rivers, respectively (Thompson et al. 1997; Jones 2003, 2005-2012; Oklahoma Biological Survey 2011; Oklahoma Natural Heritage Inventory 2013). Clean Line is committed to avoiding Project-related activities within 0.25 miles of areas where ILT are actively nesting or communally roosting (see Section 5.25.6.2, "Species-specific Measures"). With these measures, the Project would avoid or minimize most potential direct mortality/injury, sensory disturbance, and habitat loss/alteration impacts. The USFWS has raised collisions with the Project's transmission lines as a potential issue of concern. However, only one known ILT mortality has been attributed to power line collision at a location where the power line crossed directly over a breeding colony. Despite this documented mortality, the risk of collision under those circumstances is still considered "rare" by the report's authors (Dinan, Jorgensen, and Bomberger Brown 2012). In addition to siting the Project to avoid nesting habitats, Clean Line will also develop an Avian Protection Plan and adhere to current APLIC guidelines to identify avian collision risks, and to implement measures to avoid or minimize those risks. Interior least tern collisions with the Project would be highly unlikely as the Project's design and proposed protection measures would reduce the already remote potential for ILT to collide with a power line.

Taking into consideration the proposed Project design as well as the implementation of the aforementioned EPMs and species-specific measures proposed by Clean Line, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project "may affect, but is not likely to adversely affect" the ILT.

The Project "will not destroy or adversely modify" critical habitat for the ILT as critical habitat has not been federally designated.

5.26 Lesser Prairie-Chicken

The USFWS published a final rule in April 2014 listing the lesser prairie-chicken (*Tympanuchus pallidicinctus*), hereafter LEPC, as threatened effective May 12, 2014 (USFWS 2014a). Critical habitat has not been designated for the LEPC.

5.26.1 Natural History

Range

The LEPC is a largely ground-dwelling grouse endemic to the South Central Semi-Arid Prairies Level II Ecoregion of the United States (Commission for Environmental Cooperation 2009). The bird is spottily distributed across portions of northwestern Oklahoma, western Kansas, southeastern Colorado, southeastern New Mexico, and portions of the High Plains and Panhandle of Texas (Van Pelt et al. 2013). Historically, the species occurred more widely in the South Central Semi-Arid Prairies ecoregion from southeastern Colorado and western Kansas southward through much of eastern New Mexico and western Texas (Hagen and Giesen 2005), but it has been eliminated from much of its former range as a result of widespread conversion of native vegetation communities to cropland (USFWS 1998). Elmore et al. (2009) state that "as a rule" LEPCs "cannot persist in landscapes with greater than 30 percent cultivation."

The Playa Lakes Joint Venture (PLJV), a non-profit partnership of federal and state wildlife agencies, conservation groups, private industry and landowners dedicated to conserving bird habitat in the Southern Great Plains, maintains a map of the estimated occupied range (EOR) of the LEPC that is updated as on-going surveys refine knowledge of the distribution of the species (PLJV 2011). The map of the LEPC EOR was incorporated into the Western Governors' Association Southern Great Plains Crucial Habitat Assessment Tool (CHAT) developed for the LEPC by the Kansas Biological Survey and numerous cooperating wildlife agencies (CHAT 2013). The CHAT is a decision support tool used in The Lesser Prairie-Chicken Range-wide Conservation Plan (RWCP) developed by the Western Association of Fish and Wildlife Agencies (WAFWA) to model LEPC habitat and identify priority areas for LEPC conservation (Van Pelt et al. 2013).

The LEPC EOR encompasses approximately 30,900 square miles (sq. mi.) (Van Pelt et al. 2013). The current EOR represents approximately 17 percent of the historical range of the species; 95 percent of the EOR occurs on private lands (Van Pelt et al. 2013).

Habitat

The LEPC is a permanent resident of its range. LEPC habitat is generally described as dwarf shrub/mixed grass vegetation (Hagen and Giesen 2005). Copelin (1963) described habitat of the LEPC as shrub savannah intermediate between brushless prairie grassland and low-density forest, and reported that the birds did not occur in grassland lacking brush. In Oklahoma, LEPCs are most closely associated with bluestem grasses mixed with sand sagebrush (*Artemisia filifolia*) and sand shin oak (*Quercus havardii*) (Copelin 1963). Grasses often present in habitats used by the LEPC in Oklahoma include sand bluestem (*Andropogon hallii*), little bluestem (*Schizachyrium scoparium*), sand dropseed (*Sporobolus cryptandrus*), three-awn (*Aristida* spp.), and blue grama (*Bouteloua gracilis*) (Copelin 1963; Hagen and Giesen 2005).

Brush was considered by Copelin (1963) as an important component of LEPC habitat because it provided shade for the birds during hot weather. Sand sagebrush, sand shin oak, and other shrubs such as fragrant sumac (*Rhus aromatica*) and sand plum (*Prunus gracilis*) also provide important sources of food for LEPCs during the fall and winter months, when the birds feed primarily on plant matter (Riley et al. 1993). Insects form a large part of the LEPC diet in the summer (Riley et al. 1993; USFWS 1998). Patten et al. (2005) found that adult LEPC survivorship was higher in microhabitats that were cooler, more humid, less exposed to wind, and had greater shrub cover.

Descriptions of LEPC habitat are often divided into nesting habitat, brood-rearing habitat, and autumn/wintering habitat categories. In general, hens usually nest in areas with a well-developed cover of bunchgrasses or shrubs, but after hatching the hens move their broods into less densely vegetated areas where the chicks can move more easily and insects and more abundant. (Robb and Schroeder 2005; Pitman et al. 2005; Elmore et al. 2009). Brood-rearing habitat tends to have greater forb cover and less grass cover than nesting habitat (Ahlborn 1980; Applegate and Riley 1998). Nesting and brood-rearing habitats typically are inter-mixed. Hagen and Giesen (2005) describe LEPC wintering range as similar to habitats used in the breeding season, with birds in winter having greater potential to use small-grain fields for feeding and shrubby riparian zones for cover. Van Pelt et al. (2013) allowed that LEPC may range across larger areas in autumn and winter, but because the birds occupy the same type of habitat during these times of year as during the breeding season, the RWCP does not make specific provisions for autumn/winter habitat management. Bidwell et al. (2001) identified the average home range of an LEPC as approximately 4 square miles (2,560 acres). Average home range size in the breeding season for male and female LEPC in Colorado was measured at 521 acres and 1,472 acres, respectively (Hagen and Giesen 2005).

LEPCs in Kansas have been found nesting in Conservation Reserve Program (CRP) grasslands planted to mixed, native warm-season grasses, and have also been found nesting in plots planted to Old World bluestems (*Bothriochloa ischaemum*), although these non-native grasses are considered to provide poorer quality habitat (Wolfe et al. 2003; Fields 2004; Van Pelt et al. 2013). Seemingly important to the use of CRP grasslands by LEPC is an intermixing of forbs, which increases insect availability (Fields 2004; Hagen et al. 2004).

The RWCP divides the range of the LEPC into four regions based on the dominant type of habitat used by the birds in those regions: Sand Shinnery Oak Prairie; Mixed Grass Prairie; Sand Sagebrush Prairie; and Shortgrass/CRP Mosaic. (CRP refers to grasslands enrolled in the Conservation Reserve Program administered by the Farm Service Agency of the U.S. Department of Agriculture). The project disturbance footprint crosses through the Mixed Grass Prairie region of the LEPC as defined in the RWCP (Van Pelt et al. 2013).

Breeding Ecology

LEPC are one of several gallinaceous species in North America that use a lek mating system. A lek is a site where males of a species concentrate and put on ritualized breeding displays in attempt to attract females and mating opportunities. LEPCs gather at lek sites most days from late February through early May for courtship displays (Copelin 1963; USFWS 1998). Lek sites are typically situated in flat areas of bare ground or very short grass and usually occur on knolls or ridges, although valley floors will also be used if appropriate short grass is present (Copelin 1963). Disturbed grounds such as unpaved roads, oil pad sites, reverted cropland, cultivated fields, areas treated with herbicides, and recently burned areas can also be used for lek activity (Robb and Schroder 2005; Van Pelt et al. 2013). The number of males attending a particular lek usually ranges from 10 to 20, but will be less when populations are low (Copelin 1963). The combined home ranges of LEPCs populating a lek may be 12,000 acres or more (Bidwell et al. 2001). Average lek density in Oklahoma since 2001 is approximately one lek for every 9,412 acres of range (Schoeling 2010 as cited in USFWS 2012). Home ranges of individual LEPC vary in size by season and gender. In general, female home ranges are larger than those of the males, and all have larger ranges in winter than in the breeding season.

Individual male LEPCs defend a small territory at a lek site against other males and show high fidelity to that territory, often defending the same area for life and staying relatively close to their lek throughout the year (Copelin 1963; Hagen and Giesen 2005). In a study of marked birds, Copelin (1963) found that yearling LEPCs were apt to move greater distances between seasons, with adult birds, having become tied to leks, generally making shorter seasonal movements. Some yearling male LEPCs will visit several leks before deciding where to establish a territory (Copelin 1963; Hagen and Giesen 2005).

Male LEPCs generally arrive at lek sites approximately 30 to 60 minutes before sunrise and may remain at the sites for three to four hours, although peak lekking activity occurs within the first 105 minutes following sunrise (Copelin 1963; Crawford and Bolen 1975). Males make booming or gobbling calls, stamp their feet, and shake their wings when displaying on their territories, presumably to advertise their presence and potential to females and defend their territories against adjacent males (Sharpe 1968 as cited in Hagen and Giesen 2005). Arrival of females sparks an increased intensity of display by males, as well as chasing and fighting between males. Attendance of leks by female LEPCs peaks during the second and third weeks of April; the number of males attending leks drops rapidly once females stop visiting the leks and begin nesting (Hagen and Giesen 2005). Dominant males at the leks gain most mating opportunities (Sharpe 1968 as cited in Hagen and Giesen 2005).

During the breeding season, attendance and displaying at leks by LEPCs is also common in the evening, with activity peaking within an hour of sunset (Crawford and Bolen 1975). Male LEPC stay closer to lek locations throughout the year than do the female birds and have been observed convening at their leks in all months but August and December (Jones 1964).

Hens usually begin nesting from mid-April to late May, with most nesting within 1.5 miles of their lek site; clutch size is usually 10 to 12 eggs (Giesen 1994; Hagen and Giesen 2005). Females incubate their eggs for 23 to 26 days (USFWS 1998). Young generally leave the nest within 24 hours of hatching and a second nesting may be attempted if the first attempt fails (USFWS 1998; Hagen and Giesen 2005). Most hatching occurs from late May to mid-June, with hatching from second nesting attempts largely occurring from late June through early July (Hagen and Giesen 2005). Increased nest success has been correlated positively to shorter distance between lek and nest sites; height, density, and abundance of grasses at the nest site; placement of the nest within or adjacent to shrubs or tall bunchgrasses; and decreased presence of bare ground cover (Hagen and Giesen 2005; Pitman et al. 2005). LEPCs are not territorial away from lek sites. Copelin (1963) found that after leaving the nest, LEPC broods would intermingle and that broods would move about an area ranging from approximately 160 to 256 acres, depending on habitat conditions.

Autumn/Winter Ecology

LEPCs range more widely in the autumn and winter months than in spring/summer in response to lack of insects and decreased food availability. Birds will travel to visit small grain fields (Copelin 1963; Hagen and Giesen 2005). Copelin (1963) found in a study of 114 marked birds that even in winter most LEPCs (n = 90) traveled less than 2 miles, with all but one bird traveling less than 5 miles. The maximum LEPC travel distance recorded by Copelin (1963) was 10 miles (n = 1). However, such distances could be traveled daily by birds moving between lek sites and feeding locations (Campbell 1972).

Flight Behavior

LEPCs spend most of their time on the ground, but the birds will fly to and from lek sites when moving between feeding and roosting areas, to reach water sources, or when disturbed (Hagen and Giesen 2005). Flight distances are typically less than 3,280 feet, but the birds are capable of longer flights (Hagen and Giesen 2005). Hagen and Giesen (2005) state that flight heights are usually below 328 feet. Refining this, Pruett et al. (2009a) observed that LEPCs “rarely, if ever, fly higher than 6 meters” (20 ft.).

5.26.2 Population Status

No good historical population estimates exist for the LEPC (USFWS 1998). The species was considered quite common throughout its range in the early 20th century, but populations appear to have dwindled by the 1930s as a result of widespread conversion of native grasslands to croplands, overgrazing, and drought (USFWS 1998). Since the mid-20th century, LEPC populations appear to have fluctuated on a regional basis while trending generally downward (USFWS 1998). LEPC populations can fluctuate considerably from year to year in response to variation in precipitation and other weather conditions (USFWS 2012). As summarized by the USFWS (2012), the total LEPC population was estimated to be 36,000 to 43,000 birds in the mid-1960s, perhaps rose up to about 60,000 birds in the early 1970s, and then was down to 44,400 to 52,900 birds in the fall of 1980 and 32,000 birds in 2003. Information provided by the USFWS (2012) suggests that circa 2000, approximately 3,000 LEPC occurred in Oklahoma at an average density of approximately one bird per 78 acres.

A range-wide aerial population monitoring program began in 2012 in support of development of the RWCP. This has initiated a more comprehensive evaluation of the size and trends of the LEPC range-wide population (Van Pelt et al. 2013). Surveys are conducted by helicopter along transects established within 9 mile x 9 mile grid cells; two transects are flown per grid cell and a sub-set of the total number of grid cells is surveyed each year (McDonald et al. 2013). Table 5.26-1, "Estimated Total Abundance of LEPCs Throughout the Estimated Occupied Range: 2012 and 2013," provides the range-wide estimated LEPC population for 2012 and 2013 based on the results of these surveys, by habitat ecoregion as defined in the RWCP.

Table 5.26-1
Estimated Total Abundance of LEPCs
Throughout the Estimated Occupied Range: 2012 and 2013

Ecoregion	Estimated Population		90% Confidence Interval				Estimated Total # of Leks	
			2012		2013			
	2012	2013	Low	High	Low	High	2012	2013
Sand Shinnery Oak Prairie	2,946	1,967	1,325	7,973	844	3,754	366	118
Sand Sagebrush Prairie	3,005	1,802	134	7,194	552	3,538	327	323
Mixed Grass Prairie	8,076	3,567	3,022	14,640	968	6,761	794	356
Shortgrass/CRP	20,413	10,279	10,669	31,564	2,349	11,646	1,443	1,240
Total	**34,440**	**17,616**	**21,718**	**52,076**	**8,442**	**20,978**	**2,930**	**2,036**

Source: McDonald et al. 2013.

The total 2012 LEPC population was estimated to be 34,440 birds (90% CI: 21,718 to 52,076), which is generally similar to those population estimates made in the mid-1960s and 2003. In 2013, the population was estimated to be 17,616 birds (90% CI: 8,442 to 20,978) (McDonald et al. 2013). McDonald et al. (2013) identified on-going drought as a "likely contributing cause" for the population decrease estimated to have occurred from 2012 to 2013 without identifying other possible contributing causes. After notable increases in rainfall in 2013, the LEPC population was estimated to have increased by about 20 percent to around 22,000 birds in 2014 (WAFWA 2014). Rainfall has eased drought conditions within portions of the range of the LEPC in 2014 (United States Drought Monitor 2014), so reason exists to be optimistic with regard to potential for LEPC populations in 2015 to at least regionally continue with the rebound suggested by the 2014 survey results.

Garton (2012 unpublished data cited in Van Pelt et al. 2013) conducted a population analysis based on past and current trends and estimated that without substantial intervening management efforts, the LEPC population would drop to around 10,000 in 30 years and to less than 1,000 in 100 years. This analysis indicated the Shortgrass/CRP Mosaic ecoregion was projected to support a sustainable LEPC population and the highest increase in population over time. Conversely, the Mixed Grass Prairie and Sand Sagebrush Prairie ecoregions showed increased risk of population decline below sustainable thresholds over time.

5.26.3 Current Threats

The greatest threat to the LEPC remains the same problem that has caused the species to decline over the past century, i.e., loss of habitat (USFWS 1998, 2012). Threats and potential threats to the LEPC cited by the USFWS (2012) in its proposed rule to list the species as threatened are extensive and include habitat fragmentation; habitat conversion for agriculture; livestock grazing; shrub control; altered fire regimes and encroachment by invasive woody plants; wind power and energy transmission operation and development; petroleum production; roads and other linear features; collision mortality; pesticide use; climate change; extreme weather events; predation; hunting; nest parasitism and competition with exotic species, hybridization; reduced population size and lek mating system; and surface water impoundments. Most of these threats, if realized, result in direct loss of habitat or the indirect loss of habitat as a result of LEPC avoidance behaviors, as discussed below. See USFWS (2012, pp. 73851-73880) for a full discussion of these threats.

Widespread habitat loss through conversion of prairie to various agricultural uses such as tilling and grazing is undoubtedly the primary reason that LEPC numbers dropped substantially in the first half of the 20th century (Mote et al. 1999; USFWS 1998). Since that time, LEPC habitat has continued to be lost to agriculture, although large-scale conversion of native prairie to cropland ended in the 1980s (Robel et al. 2004). The USFWS (2012) indicated that rate of conversion of prairie to cropland within the range of the LEPC has been low over the past two decades, largely because nearly all lands suitable for cultivation have already been converted to agricultural purposes. The agency further suggested the possibility that some cropland may ultimately convert back to a non-cropland state because of ongoing drought and reduced supplies of water for irrigation but did not consider this likely to provide significant results with regard to increasing the amount of available LEPC habitat (USFWS 2012). Overall, the USFWS (2012) considers the threat of conversion of prairie to agricultural uses to be of lesser importance to the LEPC than it was in the past, but the current agricultural landscape that arose from past conversion now presents significant challenges to the conservation and recovery of the species.

With the conversion of prairie to agricultural purposes having slowed considerably (Robel et al. 2004), threats to the LEPC of most importance are those that could eliminate LEPCs from remaining stands of habitat. The viability of extant habitat can subtly or gradually be impaired or eliminated altogether as a result of encroachment by woody species such as mesquite (*Prosopis glandulosa*) and eastern red cedar (*Juniperus virginiana*), through eradication of shrubs needed by LEPCs by ranchers looking to improve grazing conditions, and through alteration by heavy grazing pressure. Invasion of LEPC habitat by trees is especially worrisome because it requires much more effort by land managers to combat or correct than does altering grazing regimes or elimination of shrub control (USFWS 2012).

The construction of wind energy generation facilities and associated transmission lines and development connected to petroleum production within or close to LEPC habitat can affect LEPCs in two ways. One is by causing further loss of habitat in areas used for construction of wind turbines, electrical substations and other facilities used to support transmission of electricity, oil and gas well pads, compressor stations, etc. The amount of vegetation lost to a wind power project typically represents a small percentage of the total area spanned by the project (The Wildlife Society 2007). Habitat lost directly to transmission line projects in prairie habitats is generally negligible. Transmission line ROWs do not need to be cleared for safety and reliability reasons in prairie habitats as they do when lines cross through woodland because vegetation in prairie habitat is not at risk of coming in close contact with the overhanging transmission lines (NERC 2012). Oil and gas production, however, can result in comparatively heavy loss of habitat, especially where drilling pads are spaced close together (Jones 2013).

Studies performed mostly over the past 15 years have indicated that LEPCs tend to avoid sources of loud human-made noise and permanent structures, including oil and gas wells, transmission lines, wind turbines, radio towers, and houses and other buildings (Robel et al. 2004; Pitman et al. 2005; Pruett et al. 2009b; Hagen et al. 2011). The distances out to which LEPCs will avoid these features, however, are still being studied and debated. Some studies have indicated that most LEPC nests are located at least 4,118 feet from buildings, 2,587 feet from improved roads, and 1,162 feet from transmission lines (Pitman et al. 2005; Pruett et al. 2009b; Hagen et al. 2011). Robel et al. (2004) found in a six-year study that 95 percent of a total of 18,866 LEPC locations that were measured using radio telemetry occurred at mean distances greater than 1,977 feet from buildings, 2,079 feet from transmission lines, 237 feet from oil or gas wellheads, and 153 feet from roads. Hagen et al. (2011) found that transmission lines and buildings were the manmade features least likely to occur within monthly home ranges of LEPCs. The USFWS (2012) recognized that LEPCs appear to be more tolerant of wind turbines than some other species of grouse. Pitman et al. (2005) found that distance from human disturbances did not influence nest success; instead, nest success appears to depend more on local vegetative characteristics.

Robel et al. (2004) also found that LEPCs rarely nested within 1,008 feet of the edges of center-pivot agricultural fields. The authors were unsure of the reason behind the avoidance of seemingly benign fields but speculated that the birds could be avoiding the fields themselves, noise emitted by the irrigation pumps, or the sprinkler booms that moved in rotation across the fields. Reasons that LEPC avoid some manmade features are not fully understood and can be expected to vary by feature type. Hypotheses for this behavior have suggested that reasons may include noise, movement, height of the structures, ability of vertical structures to provide perches for potential predators, and sensitivity to electromagnetic fields (Robel et al. 2004; Pitman et al. 2005; USFWS 2012). The body of scientific evidence suggests that while LEPCs avoid certain manmade features, no direct correlations have yet been established.

The RWCP established a system allowing incidental take of LEPCs while conducting otherwise lawful activities (e.g., construction of a wind energy generation facility or an oil well drilling pad) under a special rule published by the USFWS (2014b). Authorization to incidentally take LEPCs is gained in exchange for payment of fees used to conserve, manage, and restore LEPC habitat. The amount paid to participate in the plan is based on the acreage of LEPC habitat expected to be directly and indirectly affected by the proposed project, with allowance made for habitat already considered to have been impacted by pre-existing disturbance. Table 5.26-2, "Pre-Existing Impact Buffer Distances Used in the RWCP," identifies the buffer distances used in the RWCP to calculate previously impacted LEPC by impact type.

The avoidance of anthropogenic features by LEPCs reduces the effective size of patches of otherwise seemingly suitable habitat extant on the landscape (Robel et al. 2004; USFWS 2012). Concern exists that reductions in habitat patch size will cause LEPC populations in smaller patches to drop below the minimum threshold needed to sustain the population, ultimately leading to localized extinctions (Harrison and Bruna 1999; Frankham et al. 2002; USFWS 2012). Transmission lines have been identified as potential barriers to LEPC movement; roads do not appear to act as barriers to LEPC movement (Pruett et al. 2009b; Hagen et al. 2011).

Table 5.26-2
Pre-Existing Impact Buffer Distances Used in the RWCP

Type of Impact	Buffer Distance (ft)
Distribution lines (<69 kV)	33
Private roads	33
Secondary roads	220
Residential buildings	436
Oil and gas pads	656
Transmission lines (≥69kV)	1,312
Primary roads	1,640
Industrial buildings	2,188
Tall vertical structures (> 150 ft)	2,188
Wind turbines	2,188

Source: Van Pelt et al. 2013

Overall, concern exists that LEPCs occurring in the stands of habitat that survived the large-scale conversion of prairie habitats to agricultural lands in the 20th century have been, or will be, partitioned into small populations effectively isolated from each other as a result of the presence of transmission lines, wind energy generation facilities, oil/gas wells and facilities, and homes and other structures. Small, isolated populations of LEPC are at greater risk of extirpation as a result of prolonged drought or other extreme weather events (USFWS 2012). Barriers to movement reduce the likelihood of diminishing populations of LEPCs contained in isolated patches of habitat from being augmented by immigration of LEPCs from outside sources (USFWS 2012).

With regard to threats unrelated to those affecting habitat, the USFWS (2012) indicated disease was not cause for concern and that predation was not likely a significant threat to healthy populations of LEPC. However, the USFWS (2012) considered predation likely to contribute to the decline of the species, in part because increases in number of trees, fence posts, and power poles could increase LEPC predation rates by increasing the number of available hunting perches for raptors. Hunting was not considered a threat to the LEPC by the USFWS (2012). Colorado, New Mexico, Oklahoma, and Texas all prohibited hunting LEPCs prior to the listing of the species as threatened (USFWS 2012); Kansas closed its LEPC hunting season after the listing (Kansas Department of Wildlife, Parks and Tourism 2014).

The USFWS (2012) reported no known documentation of LEPCs having suffered mortality from collision with wind turbines. LEPCs are known to suffer mortality from collision with fences, power lines, and automobiles (USFWS 2012). Wolfe et al. (2007) were able to determine the cause of death in 260 out of 322 LEPC carcasses recovered in Oklahoma and New Mexico. The leading cause of death (n = 91, 35.0 percent) was predation by raptors. Next was collision with fences (n = 86, 33.1 percent), followed by predation by mammals (n = 76, 29.2 percent). Other causes of mortality were collision with power lines (n = 4, 1.5 percent) and vehicle collisions (n = 3, 1.2 percent). Wolfe et al. (2007) did not differentiate between transmission lines and the smaller, less visible, and much lower to the ground distribution lines. The results of the Wolfe et al. (2007) study does suggest that collision with power lines of any type is responsible for a very low percentage of LEPC mortality. The potential for LEPCs to collide with the larger, more visible, and taller transmission lines appears to be very low, especially if the birds are avoiding them by distances of 1,312 feet or more and given the observed flight heights (< 6 meters [Pruett et al. 2009a]). Galliforms (chicken-like birds, including grouse) are one of several groups of heavy-bodied birds considered most susceptible to power line collisions (Avian Power Line Interaction Committee [APLIC] 2012).

5.26.4 Potential Presence in the Action Area

Definition of the Action Area

The LEPC Action Area has been defined as the area contained within a 1,312-foot buffer on the centerlines of those segments of the HVDC and alternating current collection system route (ACCSR) alignments that lie within a 10-mile buffer of the edge of the LEPC EOR, referred to as the EOR+10. The Action Area captures the project disturbance footprint, which includes the transmission line ROW and the associated access roads, within the EOR+10 area. Total length of the HVDC alignment in the Action Area is approximately 142 miles. Approximately 91.6 of those 142 miles cross through the LEPC EOR in Beaver, Harper, and Woodward counties, Oklahoma. The remaining approximately 50.4 miles of the HVDC alignment in the Action Area lie outside the EOR in Beaver, Texas, and Woodward counties, Oklahoma.

Five segments of the ACCSR are contained in the Action Area and have a combined length of approximately 84 miles. About 17.4 of those 84 miles occur within the LEPC EOR in Beaver and Texas counties, Oklahoma. The remaining approximately 66.6 miles of the ACCSR segments in the Action Area lie outside the EOR in Beaver and Texas counties, Oklahoma, and Hansford and Ochiltree counties, Texas.

Length of the segments of transmission line alignment included in the Action Area were extended through the EOR+10 instead of being limited to the EOR to match the area of coverage by the RWCP. The RWCP used the EOR+10 as its covered area because of uncertainty in complete accuracy of the mapped boundary of the EOR (Van Pelt et al. 2013). The EOR+10 area is also the area modeled by the CHAT (CHAT 2013), with the CHAT incorporating this greater area to allow for range expansion and planning. The 1,312-foot buffer to alignment centerline was used to define the width of the Action Area because this is the distance used in the RWCP as approved by the USFWS to quantify pre-existing disturbance of LEPC habitat caused by $\geq$ 69 kV transmission lines.

Presence in the Action Area Based on Existing Data

The Oklahoma Department of Wildlife Conservation (ODWC) has surveyed and sponsored surveys for the LEPC across a large majority of its range in the state. Surveys for the LEPC are conducted in the spring when the birds are vocalizing at leks. These vocalizations can be heard from a mile away or more, making it feasible to conduct surveys for the species at points established along public roadways. The LEPC CHAT website (kars.ku.edu/maps/sgpchat/) provides information that includes geographic information software (GIS) data layers that depict the extent of 2009-2013 LEPC survey coverage and locations of LEPC leks found during surveys conducted from 2008 to 2012.

Figure 5.26-1, "LEPC Survey Coverage and Known Lek Locations in the Action Area Region," depicts the extent of LEPC survey coverage and locations of leks in and surrounding the Action Area. The CHAT identifies LEPC leks, which for general mapping purposes could be shown as points on the ground, as circles with diameters of slightly more than 3 miles. This presumably was done to incorporate in each mapped lek the area expected to be used for nesting by most hens that visit the lek.

As shown on Figure 5.26-1, "LEPC Survey Coverage and Known Lek Locations in the Action Area Region," nearly all lands along the length of the Action Area within the EOR were surveyed for LEPCs at least once during the 2009 to 2013 period, as were most lands crossed by segments of the Action Area within 10 miles of the EOR. Several of the ~3-mile diameter leks as depicted by the CHAT are crossed by or occur in general proximity to the north and south sides of an approximately 36-mile long segment of the Action Area in south-central and southeastern Beaver County and southwestern edge of Harper County. LEPC leks were also found south of an approximately 8 mile length of the Action Area located to the east in southwestern Harper County (see Figure 5.26-1, "LEPC Survey Coverage and Known Lek Locations in the Action Area Region").

Based on the identified lek locations and extent of recent survey coverage as identified by the CHAT, LEPCs do not appear to occur in general proximity to any other segments of the Action Area. The west side of the EOR in Oklahoma and Texas as depicted on Figure 5.26-1, "LEPC Survey Coverage and Known Lek Locations in the Action Area Region," appears to have been drawn largely by buffering 5 miles or so out from identified lek locations. This same method was not used on the east side of the EOR in Oklahoma, where a rather broad area that is traversed by the Action Area in south-central Harper County and adjoining northwestern Woodward County was included in the EOR despite recent survey results showing no LEPC leks found in this area.

Additional Desktop/Field Analyses

An assessment of LEPC habitat suitability in the Action Area was performed by SWCA Environmental Consultants (SWCA). Fieldwork for the assessment was performed by vehicle from July 21 to July 25 2014, and was limited to those portions of the Action Area that could be viewed from public roads; no private property was accessed.

The LEPC habitat assessment was performed in accordance with the Data Collection and Evaluation Plan as reviewed and approved by the USFWS (Ecology and Environment, Inc. 2014). This required describing vegetation in each homogenous vegetation unit within the Action Area as allowed by visibility from a public road, with descriptions based on criteria for defining habitat quality contained in the RWCP (Van Pelt et al. 2013). The criteria for defining habitat quality in the RWCP are vegetative cover, vegetative composition, percent cover of tall woody plants, and availability of potential habitat. Habitat quality under the RWCP is scored on a scale of 0.0 to 1.0, with 1.0 being highest quality, although a score of 0.0 is attainable only if < 1 percent of land within 1 mile of an examined vegetation unit supports grass cover. Any vegetation unit with a score > 0.0 is considered under the RWCP to be LEPC habitat of some value; numerical values are not categorized in terms of "high quality," "low quality," etc.

The SWCA assessment allowed mapping potential LEPC habitat in the Action Area based on vegetative characteristics (SWCA 2014). Potential nesting and brood-rearing habitat was identified as either "good" or "low" quality. The appearance of known vegetation communities on recent digital aerial photography was used to inform decisions on habitat suitability for lands not visible from roads. Contrary to the RWCP system, vegetation communities that did not appear to provide habitat suitable for LEPC nesting or brood-rearing (e.g., woodlands, croplands, and extensive stands of shortgrass prairie) were not identified as potential LEPC habitat, but instead were classified in other land cover categories.

Land cover was divided by SWCA (2014) into eight basic categories. The amount of each type of land cover identified within the Action Area is presented in Table 5.26-3, "Summary of Land Cover in the Action Area." Descriptions of each land cover type are provided in Table 5.26-4, "Definition of Land Cover Types Identified in Table 5.25-3." As shown in Table 5.26-3, "Summary of Land Cover in the Action Area," agricultural lands (including cropland) and lands identified as low quality LEPC habitat are the dominant land cover types across the whole of the Action Area as well as only within the boundaries of the LEPC EOR. The SWCA habitat assessment report is provided in Appendix F. This report provides greater detail on the methods used to conduct the assessment and contains figures that depict the distribution of each land cover type within the Action Area.

Table 5.26-3
Summary of Land Cover in the Action Area

Land Cover	Total in Action Area (ac.)	Total in EOR in Action Area (ac.)
Agricultural	17,571.9	8,137.9
Cropland	17,018.4	8,347.1
Invaded Grassland	2,194.4	1,041.4
Non-Habitat Grassland	6,186.5	2,506.1
Good Quality LEPC Habitat	4,391.4	1,971.5
Low Quality LEPC Habitat	14,649.1	7,869.5
Short Herbaceous	2,793.3	1,189.5
Non-Herbaceous	8,260.1	3,825.4

Source: SWCA 2014

While conducting the habitat assessment, SWCA also mapped the locations of manmade features in the Action Area that had been constructed too recently to appear on aerial photographs used as field maps. Such features included transmission lines, houses, and oil/gas well pads. Locations of these features were later digitized using GIS software and added to a digitized set of locations of these features in the Action Area compiled previously by Clean Line personnel through review of aerial photography.

5.26.5 Direct and Indirect Impacts

Germane to the impact discussions below are the proposed routes of the HVDC alignment and ACCSR alignments within the LEPC EOR. These alignments were sited to follow existing linear infrastructure (i.e., transmission lines, roads, etc.), wherever feasible. Locations of existing transmission lines followed by the HVDC and ACCSR alignments or that cross those alignments are shown on Figure 5.26-2, "Locations of Existing Transmission Line Alignments in the Action Area." As shown on this figure, the HVDC alignment follows existing transmission lines across the entire approximately 44-mile long segment where LEPCs may occur in general proximity to one or both sides of the centerline of the Action Area, as indicated by the lek locations available through the CHAT. For most of this 44-mile stretch, the HVDC alignment is offset from an existing overhead transmission line by slightly more than 200 feet. An approximately 2.9-mile long segment of the 44-mile section of HVDC alignment is set between two overhead lines. As also shown on Figure 5.26-2, "Locations of Existing Transmission Line Alignments in the Action Area," one of the two segments of ACCSR located in the EOR follows an existing overhead transmission line for its entire length in the EOR, while the other does not.

Direct Mortality/Injury

Construction of transmission lines within the range of the LEPC creates potential for the species to suffer direct injury or mortality by any of the three following means: 1) crushing of eggs or immobile chicks by construction or maintenance vehicles/equipment; 2) collision with fences or distribution lines after being flushed from cover by construction or maintenance vehicles/equipment; and 3) post-construction collision with the transmission lines. The potential for LEPCs to suffer direct injury or mortality as the result of each of these means is discussed below.

Table 5.26-4
Definition of Land Cover Types Identified in Table 5.25-3

Land Cover	Definition
Agricultural	Agricultural lands other than tilled fields. Included in this category were hayfields, pastures planted heavily with Old World bluestems, some other improved pastures, and disturbed areas used for storage of hay bales or farm equipment. Improved pastures common in the Action Area, with many pastures supporting only one or two species of grass and being devoid of shrubs, succulents, and forbs. The most commonly occurring grasses in monotypic or other low diversity pastures include Old World bluestems, sideoats grama (*Bouteloua curtipendula*), and silver bluestem (*Bothriochloa saccharoides*). Pastures composed of one or two species of grass were not identified by SWCA (2014) as LEPC habitat owing to lack of forb component necessary for CRP grasslands to support LEPC nesting (Fields 2004; Hagen et al. 2004).
Cropland	Tilled fields used for raising crops. Many fields in July 2014 were barren and some were fallow. Crops observed being raised in the Action Area included corn, wheat, and sorghum. Fallow fields in the Action Area commonly support weedy species such as Palmer amaranth (*Amaranthus palmeri*), tumbleweed (*Salsola tragus*), kochia (*Kochia scoparia*), western ragweed (*Ambrosia psilostachya*), Johnsongrass (*Sorghum halepense*), smooth pigweed (*Amaranthus hybridus*), prostrate pigweed (*Amaranthus blitoides*), horseweed (*Conyza canadensis*), field bindweed (*Convolvulus arvensis*), and prostrate spurge (*Euphorbia prostrata*).
Invaded Grassland	Grasslands of any base species composition that contain >5 percent cover of trees greater than 3 feet tall. Trees invading grasslands in the Action Area are mostly eastern red cedar, but common hackberry (*Celtis occidentalis*) and Siberian elm (*Ulmus pumila*) are also present in some areas. Invaded Grasslands are present only along the eastern third of the Action Area, where wooded communities overall occur commonly on the landscape.
Non-Habitat Grassland	A broad category used to classify grasslands and improved pastures composed of mid-height or short and mid-height grasses, often but not always mixed with sand sagebrush, soapweed yucca (*Yucca glauca*), and various forbs, Grasslands placed in this category not considered suitable habitat for LEPC due to various criteria, including small patch size, severe degradation by grazing, setting of the grassland in a predominantly woody, developed, or cultivated landscape, invasion by woody species, and absence or paucity of dwarf shrubs.
Good Quality LEPC Habitat	Vegetation that appeared highly suitable for use by LEPCs for nesting and brood-rearing, based on its species composition, structure, lack of tall woody species, and overall availability of similar vegetation on the landscape. Vegetation in this category largely consists of native grassland mixed with forbs and shrubs and sub-shrubs such as sand sagebrush, soapweed yucca, sand plum (*Prunus gracilis*), and fragrant sumac. Grasses and forbs present in areas identified as Good LEPC Habitat include little bluestem, sideoats grama, blue grama, sand dropseed, tall dropseed (*Sporobolus compositus*), three-awn, Canada wildrye (*Elymus canadensis*), western wheatgrass (*Pascopyron smithii*), gray golden aster (*Heterotheca canescens*), silver sagebrush (*Artemisia cana*), Texas croton (*Croton texensis*), prairie coneflower (*Ratibida columnifiera*), firewheel (*Gaillardia pulchella*), dayflower (*Commelina erecta*), spectacle-pod (*Dimorphocarpa candicans*), western ragweed, sand milkweed (*Asclepias arenaria*), white prickly poppy (*Argemone polyanthemos*), and common sunflower (*Helianthus annuus*).
Low Quality LEPC Habitat	Vegetation that possesses characteristics of known LEPC habitat and may be used by the species depending on location in the Action Area, but that does not contain all elements of highly suitable LEPC habitat. In comparison to vegetation identified as good quality habitat, low quality habitat typically had sub-optimal percent cover of sand sagebrush, was grazed heavily enough to impair but not eliminate ability of the vegetation to provide cover, contained relatively high abundance of Old World bluestems, or contained ≤ 5 percent cover of scattered small trees.
Short Herbaceous	Used to classify extensive stands of native shortgrass prairie, but also used to categorize large black-tailed prairie dog (*Cynomys ludovicianus*) towns where grasses that might otherwise grow taller are maintained in a short, manicured state. Native shortgrass prairie in the Action Area composed largely of blue grama and buffalograss (*Buchloe dactyloides*). If grazed heavily, also commonly containing scattered soapweed yucca, prickly pear (*Opuntia macrorhiza*), bull thistle (*Cirsium vulgare*), and curlycup gumweed (*Grindelia squarrosa*).
Non-Herbaceous	A broad category used to categorize most non-herbaceous land cover types that were obviously not suitable LEPC habitat. Included in this category were paved and unpaved public roads, oil/gas well pads, compressor stations and other industrial sites, riparian woodlands, woodlots, concentrations of ranch or farm buildings, homesteads, large stockponds, and swine farms.

Source: SWCA 2014

Scientific literature indicates that LEPCs avoid transmission lines at distances up to 1,312 feet or more. Therefore, it is expected that LEPCs will not be nesting in the project disturbance footprint wherever the transmission line alignments follow existing transmission lines. This includes the entire 44-mile long segment of the HVDC alignment that crosses through the area where LEPC leks are known to occur on one or both sides of the centerline of the Action Area. Very limited potential exists for LEPCs to nest in suitable habitat in the project disturbance footprint within the Action Area away from this 44-mile segment of the HVDC alignment owing to the lack of LEPC leks from these areas. It is recognized this potential is not zero, although it likely approaches zero with increasing distance from the EOR boundary. Regardless, the potential for construction of the transmission lines in the Action Area to inadvertently crush eggs or chicks in LEPC nests will be avoided altogether through seasonal restrictions on construction (see FVW-5 in Section 5.26.6.1, “Environmental Protection Measures,” and Section 5.26.6.2, “Species-specific Measures”).

Construction of the transmission lines is expected to result in creation of two-track access roads down the lengths of the alignments as a result of vehicular wear; construction of the lines is also expected to require the construction of a limited number of access roads outside the transmission line ROW easements. In the post-construction phase, personnel visiting the transmission line easements for maintenance and inspection purposes would use these roads, where LEPCs would not be expected to nest owing to a lack of suitable cover and proximity of the transmission lines. Therefore, vehicular travel in the transmission line easements and access roads in the post-construction phase is not expected to result in the crushing of any eggs or chicks in LEPC nests.

It is conceivable that LEPCs could occur in or close enough to the project disturbance footprint to be flushed by passing vehicles or equipment, and that in their haste to escape they could accidentally injure or kill themselves by flying into a barbed wire fence or low-hanging distribution line. Again, assuming that LEPCs avoid transmission lines, the potential for realization of this possible impact would be short-term and limited to the construction phase of the Project because LEPCs would not be expected to occur near enough to the transmission lines, following their construction, to be flushed by passing maintenance or inspection vehicles.

Further, because the centerline of the Action Area follows existing transmission lines across the general area shown by surveys to be occupied by LEPCs, the potential for any vehicles or equipment traveling this 44-mile segment of the HVDC transmission line alignment to flush any LEPCs during the construction phase appears to be quite low. The potential for vehicles and equipment to flush LEPCs in the Action Area away from the 44-mile segment also appears to be very low, owing to absence of LEPC leks from these areas as shown by recent surveys. Again, although considered quite low, the potential for LEPCs to be flushed during the construction phase of the Project is not zero and may be somewhat greater in autumn and winter when the birds range more widely than they do in the breeding season.

The odds of an LEPC flushed by a Project vehicle colliding with a fence or distribution line similarly appears to be quite low, and those odds would be influenced by the distance of the flushed bird to the nearest fence lines and distribution lines. The low likelihood of LEPCs being flushed by Project vehicles coupled with the seemingly low odds of a flushed bird then colliding with a fence or distribution line appears to make it highly unlikely that any LEPCs would suffer injury or mortality as a result of being flushed during the construction phase. The potential for this impact to occur cannot be eliminated altogether by seasonal restrictions on construction because the birds are permanent residents of their range. The potential will be reduced, however, by training personnel on how to minimize impacts on LEPCs and other wildlife and by requiring construction vehicles and equipment to travel at low speeds wherever LEPCs might occur (see GE-1, GE-6, and GE-22 in Section 5.25.6.1, “Environmental Protection Measures”). This will increase the amount of time the birds would have to hear a vehicle approach and the likelihood they would try to avoid a vehicle by walking away rather than flying.

Wolfe et al. (2007) found that approximately 1.5 percent of LEPC mortality resulted from collision with power lines, although they did not differentiate between collisions with distribution lines and collisions with transmission lines. Transmission lines occur higher off the ground and are much more visible than distribution lines, suggesting they pose less of a collision hazard to LEPCs than do distribution lines.

The transmission lines would be strung between structures that would typically be 150 to 200 feet in height, with the result being the transmission lines are expected to lie well above the height at which LEPCs typically fly (<6 meters [Pruett et al. 2009a]). The lek locations available through the CHAT indicate that LEPC may occur relatively close to both sides of the centerline of an approximately 36-mile long segment of the HVDC alignment. The HVDC alignment follows the alignments of one to two existing transmission lines across this 36-mile long section of the EOR. Because LEPCs are expected to be avoiding the existing transmission lines, construction of the HVDC transmission line adjacent to the existing lines would create a nominal increase in collision risk for the species along this 36-mile long section of the HVDC alignment. To the east of this 36-mile long segment, LEPCs appear to occur only south of the centerline of the Action Area for a distance of approximately 8 miles. Because birds do not appear to occur on both sides of the Action Area along this 8-mile segment, it is doubtful that birds would often seek to travel northward across the transmission line corridor. In this section, the centerline of the Action Area lies north of the existing transmission line and so is separated from the birds to the south by the existing line.

Outside of this total 44-mile long section of the Action Area, LEPCs may not occur in general proximity to any segments of transmission line proposed for construction, based on the lek locations available through the CHAT. Apparent absence of LEPCs from these areas coupled with transmission line avoidance behavior suggests that LEPCs may only rarely, if ever, cross the transmission line corridors outside of the 44-mile long segment in the post-construction phase of the Project.

Constructing transmission lines in the LEPC EOR would create a permanent collision hazard that would not exist in absence of the Project. However, the rate of collision by LEPCs with the transmission lines of the Project is expected to be very low, if not zero altogether because LEPCs are expected to avoid transmission lines. The Wolfe et al. (2007) study indicates that collision with power lines of all types contributes a very low percentage (1.5 percent) of LEPC mortality. Furthermore, the HVDC line would be constructed directly adjacent to and even in between existing transmission lines across the only section of EOR where lek locations indicate LEPCs occur in general proximity to the Action Area (i.e., LEPCs should already be avoiding the corridor in which the HVDC transmission line would be constructed). It cannot be concluded conclusively that a LEPC would never collide with a transmission line constructed as part of the Project, but because the collision rate is expected to be very low, any collisions occurring over time are not expected to significantly impact the LEPC at the population level.

The potential for LEPCs to suffer mortality or injury from spills of fuel or other hazardous materials during the construction process, or to suffer mortality or injury during the operational phase from spills or use of herbicides within the transmission line easements was examined and discounted. LEPCs are not expected to occur in active transmission line construction areas, not only because they should avoid construction zones but also because they are expected to be absent from land surrounding the alignment or to avoid existing transmission lines followed by the HVDC alignment, and so should not be exposed to any hazardous materials if a spill does occur during that phase of the project. Further, soils are sandy in LEPC habitat, so the ability of any spilled material to spread beyond the immediate vicinity of the spill location would be extremely limited. Clean Line would keep emergency and spill response equipment available during the construction phase so that any spills would be promptly contained (see GE-13 in Section 5.26.6.1, "Environmental Protection Measures"). Following construction, LEPCs would be expected to avoid the transmission line alignments and so would not be exposed to any spills or herbicides used in the transmission line easements. Use of herbicides by Clean Line within LEPC habitat is expected to be extremely limited, given the generally short vegetation occurring in the region. Clean

Line would apply any herbicides used in its easements in accordance with label guidelines and all applicable federal, state, and local regulations (see GE-5 in Section 5.26.6.1, "Environmental Protection Measures").

Sensory Disturbance

The USFWS (2012) suggested that LEPCs could avoid transmission lines, at least in part, owing to sensitivity to electromagnetic fields. LEPCs are not territorial away from their leks. Consequently, any LEPCs occurring in or near the Action Area could move away from any electromagnetic field emanated by the transmission lines that they found disturbing, without risk of being attacked or confronted by other LEPCs and without risk of causing other LEPC from being displaced from their home ranges. Causing LEPCs to spend proportionally more time in another bird's home range might ultimately have an impact on the fitness of some birds if food is in short supply. In this case, however, because transmission lines are already present in the corridor in which the HVDC line would be constructed in the only part of the EOR where LEPC leks are known to occur, construction of the Project would not introduce new electromagnetic fields to this area. Instead, it would add to existing electromagnetic fields, perhaps causing those fields to be able to be perceived by the birds approximately 200 feet deeper into adjacent habitat than they currently can perceive.

To illustrate the possible impact of the loss of a 200-foot wide strip of habitat, note that a 500-acre home range, if square, would measure approximately 4,667 feet long on a side. If an electromagnetic field caused a bird to stop using habitat within 200 feet of the edge of one side of that square, its range would be reduced to a 4,467' x 4,667' rectangle, which encompasses about 478.6 acres. This represents a small (-4.28 percent) reduction in range size, and one that likely would not impact a bird because it usually could be expected to be able to compensate for that reduction by expanding its range in other directions since LEPCs are not territorial. An LEPC would only have to expand its range by about 68.5 feet in the other three directions to compensate for loss of a 200-foot wide swath of habitat on the fourth side of a square 500-acre range.

Construction of the Project would permanently introduce electromagnetic fields to those portions of the Action Area where transmission lines do not currently exist. However, as indicated, LEPCs are not known to occur in any of those areas. Consequently, no evidence exists to suggest that LEPCs could be affected by the introduction of electromagnetic fields in those areas.

Because transmission lines and the electromagnetic fields they emit are already present along the corridor in which the Project would be constructed in the only portion of the EOR where LEPCs are known to occur in general proximity to the Action Area, construction of the transmission lines is not expected to cause any LEPCs to lose significant amounts of habitat such that they would no longer be capable of supporting themselves or successfully raising young. Thus, the creation of electromagnetic fields in the Action Area is not expected to result in any significant indirect adverse impacts on LEPCs.

Noise has been suggested as one of several possible reasons that LEPCs avoid manmade features, although no direct correlation between noise and avoidance by LEPCs has been established. The effects of noise on wildlife has been well studied, with chronic sources of noise having the ability to, depending on the species involved, increase stress responses, decrease fitness, reduce pairing success, impair ability to find prey, and increase susceptibility to predation (Francis and Barber 2013).

Construction activities would create a short-term source of noise in the Action Area; Project-related noises created in the post-construction phase are expected to be negligible. As discussed above, LEPCs are only expected to occur in general proximity to the Action Area where the HVDC alignment follows existing transmission line alignments. Consequently, LEPCs are expected to be avoiding the existing lines and are not expected to occur near any Project-related construction activities. While some LEPCs might occur within aural range of construction activities, no long-term or permanent indirect impacts on LEPCs are expected to be caused by construction of the Project. If any LEPC moved away from the

HVDC alignment during the construction phase strictly because of noise, then the birds would be expected to move back towards the alignment upon conclusion of construction. To minimize noise during the construction process, Clean Line will implement EPM GE-25 (turn off idling equipment when not in use [see Section 5.26.6.1 "Environmental Protection Measures"]).

Habitat Loss/Alteration

Construction of a transmission line through prairie habitat causes very little permanent physical damage to that habitat, outside of the alignments of whatever roads are developed or otherwise constructed to access the line, because the vegetation crossed by the line does not need to be cleared; the vegetation is so short that it does not pose a threat to safety and reliability of the line. (For example, see Photo 5.26-1, which depicts one of the transmission lines followed by the HVDC alignment across the LEPC EOR. Note the lack of obvious disturbance of vegetation in the transmission line easement or even around the base of the transmission line structure in the foreground. Clean Line will implement EPM FVW-1 to minimize disturbance to grassland habitat as a result of Project construction [see Section 5.26.6.1, "Environmental Protection Measures"]).

Photo 5.26-1. A transmission line present in the Action Area.

As suggested by Photo 5.26-1, the direct loss of LEPC habitat to construction of the Project is expected to be negligible. As a result, if the line were ever to be de-commissioned and removed, the fact that it was ever there would likely be difficult to discern after a few short years, apart from whatever remained of its access roads.

Of greater importance with regard to transmission lines is the indirect loss of habitat viability resulting from LEPC avoidance behavior. As discussed, it is expected that LEPCs will avoid, and therefore, vacate, otherwise suitable habitat occurring within 1,312 feet of a transmission line. Thus, construction of a transmission line could cause a swath of habitat with a total width of 2,624 feet to become unavailable for use by LEPCs. Returning to the 500-acre home range example, this means that 500 acres of habitat or the equivalent of one LEPC home range, could be rendered unviable for every 1.572 miles of transmission line constructed in LEPC habitat non-adjacent to pre-existing transmission lines (1.572 miles x 5,280 feet = 8,300.2 feet; 8,300.2 feet x 2,624 feet = 21,779,725 sq. ft. or 499.99 acres).

To examine the effect that construction of the Project would be expected to have on viability of LEPC habitat in the Action Area, Clean Line inventoried all manmade features present in the Action Area by reviewing aerial photography and updates by SWCA based on July 2014 field observations. Such features include primary and secondary roads, residential structures, barns, churches, oil/gas well pads, wind turbines, industrial complexes, overhead transmission lines, and communications towers. Distribution lines were not included in the inventory. The distance out to which the presence of these features could already be expected to have impacted LEPC habitat was determined using the buffer distances identified in the RWCP as approved by the USFWS (see Table 5.26-2, "Pre-Existing Impact Buffer Distances Used in the RWCP"). GIS software was then used to identify all potential LEPC habitat and other land cover types as mapped by SWCA (2014) occurring within the Action Area but outside of zones considered to already have been impacted by existing disturbance.

Table 5.26-5, "Summary of Land Cover in Action Area," shows the total acreage of all land cover types occurring in the whole of the Action Area (Total in Action Area) and just in the LEPC EOR (Total in EOR in Action Area) as well as the amount of each type of land cover in the whole Action Area and the amount of land in just the EOR occurring outside of the applied pre-existing impact buffers. (Table 5.26-4, "Definition of Land Cover Types Identified in Table 5.25-3," provides a description of each of the land cover types identified in Table 5.26-5, "Summary of Land Cover in Action Area.") As shown in Table 5.26-5, "Summary of Land Cover in Action Area," agricultural lands (including cropland) and lands identified as low quality LEPC habitat are the most abundant land cover types in the Action Area outside of pre-existing impact zones, just as they are in the Action Area as a whole.

Table 5.26-5
Summary of Land Cover in Action Area

Land Cover	Total in Action Area (ac.)	Total in EOR in Action Area (ac.)	Total Not Subjected to Pre-existing Impact (ac.)	Total in EOR Not Subjected to Pre-existing Impact (ac.)
Agricultural	17,571.9	8,137.9	5,457.6	1,977.3
Cropland	17,018.4	8,347.1	4,620.9	1,656.2
Invaded Grassland	2,194.4	1,041.4	703.3	655.8
Non-Habitat Grassland	6,186.5	2,506.1	1,340.5	225.5
Good Quality LEPC Habitat	4,391.4	1,971.5	2,006.1	411.2
Low Quality LEPC Habitat	14,649.1	7,869.5	5,247.7	2,022.6
Short Herbaceous	2,793.3	1,189.5	896.5	223.2
Non-Herbaceous	8,260.1	3,825.4	1,560.6	1,094.8

As discussed, the LEPC lek locations available through the CHAT indicate it is highly likely that LEPCs are near the Action Area to an approximately 44-mile long segment of the HVDC alignment that follows existing transmission lines. Consequently, the acreages identified in Table 5.26-5, "Summary of Land Cover in Action Area," are not considered to fairly identify the amount of potential LEPC habitat identified by SWCA (2014) that would both be newly subjected to loss of viability as a result of transmission line construction and that is actually expected to be used currently by LEPCs.

To better identify the amount of potential LEPC habitat in the Action Area that is expected to currently be used by LEPCs and could lose viability as habitat for the species as a result of transmission line construction, GIS software identified the amount of each type of land cover identified by SWCA (2014) present in the Action Area only within the boundaries of the leks as identified by the CHAT. Lek boundaries were drawn as ~3-mile diameter circles, presumably to encompass lands used for nesting by most of the hens attending the identified leks. Then, in order to account for the possibility that LEPCs use lands outside of the mapped lek circles, a 2-mile buffer was added to the lek locations to create an area that encompassed all lands occurring within about 3.5 miles of each lek location. The amount of each type of land cover within this larger area that would be newly subjected to the indirect effects caused by presence of a transmission line was then identified. A 2-mile buffer was chosen because the resulting 3.5-mile radius circle drawn around each lek would encompass nearly 25,000 acres (π x 3.5 miles x 3.5 miles = 38.485 sq. mi.; 38.485 sq. mi. x 640 acres/sq. mi. = 24,630.1 acres). This is more than twice the size of the area identified by Bidwell et al. (2001) needed to support an LEPC lek and so seemed appropriately conservative.

The amount of each type of land cover identified by SWCA (2014) present within the leks as mapped by the CHAT and in and within 2 miles of these leks are identified in Table 5.26-6, "Land Cover in the Action Area in Proximity to LEPC Leks." Because the alignment for the HVDC transmission line is offset by only a short distance from existing transmission line alignments as it crosses the zone where LEPCs are expected to occur in general proximity to the Action Area, very little land occurs within 1,312 feet of the HVDC centerline that is not already located within 1,312 feet of the existing transmission lines. Consequently, as indicated in Table 5.26-6, "Land Cover in the Action Area in Proximity to LEPC Leks," only 16.9 acres of vegetation identified as good- or low-quality LEPC habitat occurring within the boundaries of the leks as drawn by the CHAT would be expected to lose viability as a result of indirect impacts associated with construction of the Project.

Table 5.26-6
Land Cover in the Action Area in Proximity to LEPC Leks

Land Cover	Within Mapped Leks (ac.)	Within 2 Mi. of Mapped Leks (ac.)
Agricultural	85.7	408.0
Cropland	55.8	270.7
Invaded Grassland	0.0	0.0
Non-Habitat Grassland	11.6	37.3
Good Quality LEPC Habitat	0.9	85.9
Low Quality LEPC Habitat	16.0	306.6
Short Herbaceous	21.7	24.3
Non-Herbaceous	0.0	40.1

Source: CHAT 2013.

As a more conservative measurement based on land cover within 2 miles of mapped lek locations, as shown in Table 5.26-6, "Land Cover in the Action Area in Proximity to LEPC Leks," construction of the Project could result in the loss of viability of approximately 85.9 acres of good quality LEPC habitat and 306.6 acres of low quality LEPC habitat that could act as nesting and brood-rearing habitat for LEPCs. It might also preclude LEPCs in the future from venturing into approximately 270.7 acres of cropland and 408.0 acres of other agricultural lands, as they might otherwise do in the autumn and winter months, depending on what crops had been planted most recently in the fields and height of the grass in the agricultural pastures, many of which appear subject to grazing or periodic mowing.

As discussed in the examination of the potential for the transmission lines to cause sensory impacts, because LEPCs appear to occur near the Action Area only along an approximately 44-mile segment of the HVDC alignment that follows existing transmission lines, the vegetation that would be newly subjected to the indirect effects of transmission line construction within 2 miles of mapped lek locations (see Table 5.26-6, "Land Cover in the Action Area in Proximity to LEPC Leks") is mostly configured in thin strips approximately 200 feet wide and aligned parallel to the HVDC transmission line alignment. For the same reason as discussed with regard to possible sensory impacts, because of the pre-existing presence of one to two transmission lines directly adjacent to the alignment for the HVDC transmission line where it crosses through the zone where LEPCs appear to be restricted based on lek locations, construction of the HVDC transmission line is expected to cause comparatively modest amounts of habitat loss. While the birds may be capable of compensating for the expected loss of habitat by expanding their home ranges by as little as 70 feet or so in directions away from the transmission line alignment, the actual configuration and number of LEPC home ranges in general proximity to the Action Area is unknown. As a result, it cannot be ruled out that the loss of habitat viability as a result of indirect effects associated with Project construction could result in adverse impacts on LEPCs, particularly as a result of increased competition for a finite amount of food resources.

Transmission lines have been identified as potential barriers to LEPC movement (Hagen et al. 2011). Linear barriers to movement can divide and then isolate patches of habitat occurring on opposite sides of the barrier. In some cases, habitat patches thus divided can be rendered too small to continue to support viable populations of the species occupying the habitat, and those populations may persist only through individuals immigrating from outside sources. If all possible outside sources are on the opposite side of a barrier to movement, then the isolated population is likely to ultimately dwindle down to nothing because losses within the population will outpace recruitment.

As has been discussed, the alignment for the HVDC transmission line crosses through a zone expected to be occupied by LEPCs based on known lek locations by following the alignments of one to two existing transmission lines. LEPCs appear to occur near both sides of the centerline of the Action Area across most of this zone and perhaps only to the south of the centerline along the easternmost 8 miles of the zone. In the absence of the existing transmission lines, LEPCs would be expected to move freely back and forth across lands traversed by the HVDC alignment. However, due to the presence of the existing lines, LEPCs occurring on opposite sides of the HVDC alignment may be isolated from each other, or the rate of exchange of individuals from one side of the lines to the other may be greatly reduced over traditional rates. The CHAT mapping shows that several LEPC leks occur on each side of the existing lines. This suggests the LEPC populations present on opposite sides of the lines may not suffer unduly from the presence of this possible barrier to movement. Regardless, because one to two transmission lines are already in place in this location, construction of the HVDC transmission line across this zone is not expected to exacerbate the segregation of the birds on opposite sides of the Action Area.

No other segments of the proposed transmission lines lie between populations of LEPCs based on the lek locations made available through the CHAT (see Figure 5.26-2, "Locations of Existing Transmission Line Alignments in the Action Area"). The ACCSR alignments and the west end of the HVDC alignment all lie west of where LEPCs occur regionally, and so construction of these lines would not divide any LEPC populations. The east end of the HVDC alignment appears to lie within 5 to 10 miles of some LEPC populations located farther away to the east and northeast, but LEPC populations on the opposite side of this end of the alignment are located more than 20 miles away to the southwest. Given this total distance of separation of 25 to 30 miles, it is highly doubtful that birds in populations on opposite sides of the east end of the HVDC alignment are interacting. Consequently, construction of this segment of the HVDC transmission line also is not expected to divide any LEPC populations.

In summary, to the extent that transmission lines act as barriers to LEPC movement, LEPC populations near the Action Area can be considered to already be divided by the existing transmission lines followed by the HVDC alignment. Consequently, construction of the Project is not expected to indirectly affect LEPC populations by further restricting their movements in the Action Area.

Increased Predation

The USFWS (2012) suggested that LEPCs may suffer from increased predation rates from raptors where trees, fence posts, or power line poles or structures provide increased availability of hunting perches. Perching on structures is stated by the USFWS (2012) as giving raptors an advantage by increasing their field of view and allowing for greater speed during attacks on prey. Species of raptor that have been identified as predators of LEPCs include rough-legged hawk (*Buteo lagopus*), ferruginous hawk (*Buteo regalis*), red-tailed hawk (*Buteo jamaicensis*), Cooper's hawk (*Accipter cooperii*), northern harrier (*Circus cyaneus*), golden eagle (*Aquila chrysaetos*), and prairie falcon (*Falco mexicanus*) (Hagen and Giesen 2005).

The visibility of prey increases with predator search height (Andersson et al. 2009). For this reason, a hawk perched on a pole or in a tree would be better equipped for spotting LEPCs than it would be if standing on the ground. However, four of the raptors identified above—rough-legged hawk, ferruginous hawk, red-tailed hawk, and golden eagle—while all known to hunt from perches, also often hunt by soaring high in the air and scanning for prey down on the ground (Ehrlich et al. 1988). Soaring high in the air would provide an even better view than would a perch on a tree or pole, and diving after an LEPC from above would allow for greater speed in a hunt than would taking off from a perch from a standing start.

Cooper's hawks typically occur in woodlands and brushy habitats (Ehrlich et al. 1998) and so likely do not prey upon LEPCs very often. Northern harriers primarily hunt on the wing (Ehrlich et al. 1988), so an increase in the number of hunting perches is not expected to particularly benefit this species. Prairie falcons do prefer to hunt from perches and are capable of impressive bursts of speed, so the addition of hunting perches in an area where none previously occurred could be expected to improve this species chances of catching LEPCs. Prairie falcons are expected to occur in the Action Area during the winter and during migration, but not during the breeding season (Dunn and Alderfer 2011).

However, LEPCs are expected to avoid transmission lines by a distance of at least 1,312 feet. While prairie falcons or any other raptors sitting on transmission line structures or some other type of perch might be scanning for prey that far away, they are much more likely to be searching for prey closer to the base of their perch. Targets become less visible with increasing distance because of uneven terrain and obstructing vegetation, and capture success rates are lower for longer distance attacks (Sonerud 1992; Andersson et al. 2009\). Thus, the likelihood that a raptor sitting on a transmission line structure is specifically targeting LEPCs appears to be very slim. It seems much more likely that raptors sitting on transmission line structures would be watching for rodents, rabbits, snakes, or more closely situated birds.

Transmission structures associated with the Project would increase the number of perches available to raptors in the Action Area. The transmission line structures could be outfitted with raptor perch deterrents to reduce their ability to be used by raptors as a species protection measure, although perch deterrents are not 100 percent effective (Lammers and Collopy 2007; Slater and Smith 2010). The primary purpose of perch deterrents is not to exclude all perching activity but to minimize risk of electrocution by deterring raptors from perching on certain electrified equipment and encourage them to move to safer areas. Regardless, transmission lines are already present in the zone crossed by the HVDC alignment where LEPCs are known and expected to occur; therefore, construction of the Project would not provide raptors with something not already available to them in the Action Area in general proximity to LEPCs. Thus, the use of raptor perch deterrents appears to be of little value and therefore is not proposed as a species protection measure.

Of the species of raptor identified as potential predators of LEPC, only prairie falcons would seem to benefit from an increased presence of hunting perches in an area where LEPC occur, but because of the distance out to which LEPCs are expected to avoid transmission lines, transmission line structures are not expected to provide prairie falcons with effective LEPC hunting platforms. Consequently, construction of the Project is not expected to cause a significant change in the rate at which LEPCs in the Action Area suffer from depredation.

5.26.6 Protection Measures

5.26.6.1 Environmental Protection Measures

The following EPMs—general (GE); fish, vegetation, and wildlife (FVW); soils and agriculture (AG); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on LEPCs.

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits.
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-22) – Clean Line will impose speed limits during construction for access roads (e.g., to reduce dust emissions, for safety reasons, and for protection of wildlife).
- (GE-25) – Clean Line will turn off idling equipment when not in use.

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.

5.26.6.2 Species-specific Measures

In addition to the abovementioned EPMs, Clean Line will adhere to the following species-specific measure to further reduce and avoid impacts on the LEPC:

- Clean Line will avoid non-emergency operations, construction and maintenance activities, where humans are present, during lekking, nesting, and brooding season (March 1 to July 15) within 1.25 miles of leks recorded active within the previous five years. Clean Line will conduct pre-construction surveys for LEPC leks in areas identified in the Habitat Assessment report. This includes areas within the Estimated Occupied Range where suitable habitat exists, but recent surveys have not identified leks, as well as areas where leks have been identified as active within the last five years.

5.26.7 Effects Determination

The project disturbance footprint lies partially within Oklahoma and Texas counties known to be occupied by the LEPC, but within the LEPC EOR only in Oklahoma. The Oklahoma counties have been surveyed extensively for the LEPC during the period of 2009-2013, resulting in the identification of many leks, some of which are mapped as generally near an approximately 44-mile segment of the HVDC alignment in Beaver and Harper counties. No leks were found near any segments of the ACCSR or other segments of the HVDC alignment and, based on these surveys, LEPCs are not expected to be present in the vicinity of the project disturbance footprint outside of the 44-mile segment in Beaver and Harper counties.

The HVDC alignment follows closely the alignments of one to two existing transmission lines for the entire 44 miles of its length across the zone shown by recent surveys to be occupied by LEPCs. These transmission lines are expected to already be exerting influence on the use of habitats by LEPCs in the Action Area. Construction of the Project would not create any new barriers to LEPC movement and would not newly fragment any LEPC habitat in areas shown by recent surveys to be occupied by LEPCs. The Project could cause LEPCs occurring in the general area to withdraw about 200 feet farther away in one direction from the transmission lines already present on the landscape. While a rather nominal distance, owing to the 44-mile length of the HVDC alignment across lands believed to be occupied by LEPCs, the project could cause LEPCs to avoid approximately 392.5 acres of potential nesting and brood-rearing habitat and approximately 678.7 acres of agricultural land and cropland that might be used during non-breeding seasons (see Table 5.26-6, “Land Cover in the Action Area in Proximity to LEPC Leks”).

Given the large size of their home ranges, the avoidance of an ~200-foot wide strip of vegetation is not expected to cause the displacement of LEPCs from habitat adjacent to the Action Area. LEPCs are not territorial away from lek sites and birds should be able to compensate for the avoidance of habitat in the Action Area by expanding their home ranges perhaps by as little as 70 feet in other directions. However, the total amount of habitat available to LEPCs would be reduced, which could lead to increased competition for food resources in the affected area. Depending on the density of occupation of the habitat by LEPCs, increased competition for food could lead to food shortages, which could decrease LEPC productivity, decrease overall fitness, and increase mortality rates.

The transmission line structures may be used as perches by raptors, but the existing transmission lines already provide ample perching sites for birds of prey occurring in the area. Raptors perching on the transmission line structures are not likely to be specifically targeting LEPCs, given the distance to which they are expected to avoid the transmission lines. The transmission line would create a collision risk for LEPCs, although the birds are expected to almost always fly at heights below that of the proposed line, so the risk of collision is considered to be very low.

Because the alignment for the HVDC transmission line was purposely sited to follow the routes of existing lines where feasible, the expected impact of its construction on the status and distribution of LEPCs is much less than what would be expected if the transmission line was constructed across a region where transmission lines did not already occur. The potential for direct mortality/injury to result through collision with the transmission lines is considered to be very low, but it cannot be ruled out completely and over the life of the project some collision mortality may occur. The construction, operation, and maintenance of the transmission line within the 44-mile segment where LEPC are presumed to be present may result in LEPC avoidance of approximately 392.5 acres of nesting and brood-rearing habitat and 678.7 acres of land that might be used in non-breeding seasons. This could result in decreased productivity, decreased fitness, and increased mortality rates as a result of increased competition for food resources. For these reasons, the Project “may affect, likely to adversely affect” the LEPC. The number of LEPCs likely to be adversely affected as a result of transmission line construction cannot be quantified, but is considered likely to be relatively small owing to the non-territorial nature of the species away from lek sites.

Critical habitat has not been designated for the LEPC. Therefore, no destruction or adverse alteration of designated critical habitat for the LEPC will occur as a result of the Project.

5.26.8 Cumulative Impacts

This section discusses those effects to the LEPC expected to be caused by future State, tribal, local, and private actions that are reasonably certain to occur in the Action Area. Past and present actions are not included in the cumulative effects analysis because the effects of those actions are considered part of the baseline condition. Further, future federal actions that will be subject to separate consultation under ESA, section 7 are excluded**.** Future actions identified as reasonably certain to occur in the Action Area were derived from data collected as part of the development of the Draft Environmental Impact Statement.

Four projects have been identified as reasonably certain to occur in the Action Area. These include three road projects expected to be performed by ODOT. Each of these projects is described below:

- **State Highway 3 from Guymon east to the Texas/Beaver County Line**. Planned activities on this Texas County highway segment include the resurfacing of an approximately 7-mile long segment of road in fiscal year 2020 (ODOT 2014). This road segment lies between Guymon and Hardesty and is crossed by an ACCSR alignment approximately 9 miles outside the EOR boundary. Lands adjacent to this segment of roadway are largely agricultural and LEPCs are not known nor expected to occur at this location. Thus, this action is not expected to incrementally increase the impacts to LEPCs in the Action Area.
- **U.S. Highway 183 from Buffalo south to the Harper/Woodward County Line**. Planned activities on this Harper County highway include the widening and resurfacing of a 4.6-mile segment of road in fiscal year 2020 starting at the Harper/Woodward county line and running north (ODOT 2014). This section of highway crosses the proposed HVDC transmission line alignment within the EOR in an area identified as Low Quality LEPC Habitat, although also where the alignment passes through an existing wind farm. The nearest LEPC lek to this location based on the CHAT data are approximately 11 miles away to the northeast. Given the distance from leks and its location within an existing wind generation facility, it is not expected that this highway improvement project will incrementally increase impacts to LEPCs within the Action Area.
- ***State Highway 50B East of Woodward, Oklahoma.*** Planned activities on this road include construction of a bridge and approach over Bull Creek about 7 miles east of Woodward in fiscal year 2021 (ODOT 2014). The proposed alignment for the HVDC transmission line crosses this road about 0.2 to 0.3 mile west of the Bull Creek bridge location and approximately 0.85 mile inside the LEPC EOR boundary. Low Quality LEPC Habitat was identified as extending away from the bridge location starting about 0.3 mile away to the north, but land along State Highway 50B in the Action Area consists of a combination of woodland, small pastures, and residential development that is not suitable for use by LEPCs. Consequently, this construction project is not expected to incrementally increase effects on LEPCs in the Action Area.

5.27 Piping Plover

The USFWS listed the Northern Great Plains and Atlantic breeding populations of the piping plover (*Charadrius melodus*) as threatened and the Great Lakes population as endangered on December 11, 1985 (USFWS 2009a). The USFWS has since designated critical habitat for the Northern Great Plains and Great Lakes breeding populations in Illinois, Indiana, Michigan, Minnesota, Montana, Nebraska, New York, North Dakota, Ohio, Pennsylvania, South Dakota, and Wisconsin (USFWS 2001a, 2002, 2009a). The USFWS designated critical habitat for wintering piping plovers as well, which includes shoreline and coastal habitat in Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Texas (USFWS 2001b, 2009a). Individuals of all three breeding populations winter in these critical habitats. There are no designated critical habitats for piping plover in Tennessee, Arkansas, Oklahoma, or the Texas Panhandle.

5.27.1 Natural History

Range

The piping plover breeds on the Atlantic Coast (from North Carolina north to New Foundland and Labrador), the Great Lakes (Michigan and Wisconsin), and the Northern Great Plains (Elliott-Smith and Haig 2004; Elliot-Smith et al. 2009). The Northern Great Plains breeding population ranges from eastern Alberta, Saskatchewan, Manitoba, and western Ontario in the north through Iowa, Nebraska, and northern Kansas in the south (Elliott-Smith and Haig 2004; Elliot-Smith et al. 2009; Tern & Plover Conservation Partnership 2013). The population breeds along major prairie rivers including the Yellowstone, Missouri, Niobrara, Platte, Loup, Kansas, and Arkansas as well as alkali wetlands and some lakes and reservoirs. In Oklahoma, piping plovers nested at Optima Lake in Texas County in 1987 and 1988; however, these are the only known records and the species is considered a rare breeder in the state (see Figure 5.27.1, “Potential Presence of Piping Plover in the Action Area”) (Boyd 1991; ODWC 2011; USFWS 2013a).

Piping plovers are migratory birds that winter along the Atlantic Coast from North Carolina south, and the entire Gulf Coast (Elliott-Smith and Haig 2004; Elliot-Smith et al. 2009). The largest numbers of wintering birds occur along the Texas coast, and they are rarely found on the Virginia coastline. Outside of the United States, wintering piping plovers occur in Mexico, the Bahamas, Cuba, and other Caribbean islands. There is limited knowledge of migration routes and stopover locations between breeding and wintering grounds (Elliott-Smith and Haig 2004). The Atlantic population travels north/south along the coast, to and from their wintering grounds with stopovers en route. Most birds from the Great Lakes and Northern Great Plains breeding populations may migrate nonstop to the Gulf of Mexico or Atlantic Coast to winter, and are rarely seen at seemingly suitable inland stopover locations such as Great Salt Plains National Wildlife Refuge (Oklahoma), Quivira National Wildlife Refuge (Kansas), and Cheyenne Bottoms Wildlife Area (Kansas). Stopover records for these populations suggest fall migration routes are generally to the south or southeast. Spring migration records similarly indicate that many birds migrate nonstop to their breeding sites.

Breeding Ecology

Piping plovers form pairs upon arrival to their breeding sites between mid-March and early May (Elliott-Smith and Haig 2004; USFWS 2013a). Nest building begins during courtship, but may be delayed up to a month in cold, late springs (Elliott-Smith and Haig 2004). Generally, piping plovers nest on open sandy beaches, but appropriate nesting locations may occur in a variety of habitats. According to a 2001 census, the Northern Great Plains population bred most commonly on alkali lakes, reservoirs, and rivers, and less commonly on freshwater lakes, dry alkali lakes, sandpits, industrial ponds, and gravel mines (Elliott-Smith and Haig 2004; Haig et al. 2005). Nesting habitats are typically more exposed and sparsely vegetated, and the species may prefer substrates with higher gravel content (Elliott-Smith and Haig 2004). Piping plovers breeding on large reservoirs, lakes, and rivers often nest in or near ILT colonies. Piping plovers exhibit site fidelity, many returning to the same breeding site from the previous year. Reported site fidelity in piping plovers has ranged from 70% in Manitoba to 99% in New York (Haig and Oring 1988; Wiens and Cuthbert 1988; Cohen et al. 2006).

Male piping plovers perform elaborate courtship flights over breeding territories to attract the attention of females (Elliott-Smith and Haig 2004). The display involves deep, slow wingbeats and tilting of the body from side to side, which stands out from their normal flight behavior. Males will perform these displays throughout the breeding season, but they decrease in frequency and duration after nests have been initiated.

Clutches are typically four eggs laid in a shallow, cup-like depression in a sandy/gravelly substrate (Elliott-Smith and Haig 2004; Tern & Plover Conservation Partnership 2013). Both parents incubate the nest for approximately 28 days, but incubation time may decrease for nests initiated later in the season. Birds will lay several clutches if nests fail, but will only raise one brood in a season. Chicks are precocial and are able to walk away from the nest almost immediately. They forage for aquatic insects in the sand, but are brooded by parents until approximately 21 days of age. Brooding beyond 21 days is infrequent. Chicks fledge at approximately 28 days of age, but family groups (usually male and chicks) may persist until migrating south.

Piping plovers defend their nests and chicks by feigning injury (broken wing display) and leading potential predators away from their young (Elliott-Smith and Haig 2004; Tern & Plover Conservation Partnership 2013). Adults often flatten on their nest in response to predators during incubation (Elliott-Smith and Haig 2004). Chick responses to predators vary with age, but may include lying flat, hiding under plants or sticks, or running and then hiding (Tern & Plover Conservation Partnership 2013).

Reproductive success varies greatly depending upon location and year, but research indicates that reproductive success in the Northern Great Plains may not be sufficient to sustain the population (Elliott-Smith and Haig 2004). Chick survival is lower if a family is forced to move shortly after hatching due to a disturbance (Haig et al. 2005; Elliott-Smith and Haig 2011). Also, early nest initiation and nearby presence of other nesting pairs were both associated with an increased probability of fledging at least one chick at sites in Montana and North Dakota (Elliott-Smith and Haig 2004).

Migration Ecology

Piping plovers may leave their breeding sites as early as June, particularly after early nest failures, but typically depart in August and September (Elliott-Smith and Haig 2004; Tern & Plover Conservation Partnership 2013). In Nebraska, the latest known departure was on October 24 (Tern & Plover Conservation Partnership 2013). Typically, females leave the breeding site first, followed by unpaired males, males with fledglings, and then unaccompanied juveniles (Elliott-Smith and Haig 2004). Birds may congregate in pre-migratory staging flocks in the fall and spring. Peak return to wintering grounds in Texas occurs in August and September. Peak spring migration occurs in mid-April and both sexes tend to arrive simultaneously at larger breeding sites (Elliott-Smith and Haig 2004). Males are more likely to arrive before females at smaller breeding sites.

Most Northern Great Plains and Great Lakes piping plovers are believed to migrate non-stop to and from breeding and wintering grounds; however, stopovers do occur in the interior United States (Elliott-Smith and Haig 2004). During migration, piping plovers generally prefer beaches and alkali flats as stopover habitats, but records from the interior United States identified reservoir shorelines as the most common habitat with birds also stopping over at natural lakes, rivers, emergent wetlands, industrial ponds, and fish farms.

5.27.2 Population Status

The range-wide piping plover population suffered a significant decline beginning in the 1950s (BirdLife International 2013). In 1991, the International Piping Plover Census began extensive surveys of breeding and wintering populations that occur at five-year intervals (Haig et al. 2005; Elliott-Smith and Haig 2011; BirdLife International 2013). During that time, overall breeding population numbers increased approximately 70% from 4,668 in 1991 to 8,092 in 2006 (BirdLife International 2013). In the Northern Great Plains, breeding populations have gradually decreased since 1991, despite a large increase in breeders during the 2006 census (Elliott-Smith and Haig 2011). Declines during the 2011 census may be attributed to the high water levels from that year, which not only limited habitat but also made surveying more difficult. Preliminary results from the 2011 census indicate that numbers may also be slightly lower on the Atlantic Coast and relatively similar to 2006 in the Great Lakes. Preliminary results from the 2011 census do not include population numbers, but rather only discuss trends. Complete results from the 2011 census had not been published at the time of writing this document.

5.27.3 Current Threats

The primary threat to piping plovers is destruction and degradation of summer and winter habitat. In the Northern Great Plains, the destruction and degradation of breeding habitat is largely due to impoundments, river channelization, manipulation of water flows, draining and filling of shallow wetlands, sand and gravel mining, oil and gas production, and encroachment of vegetation on the exposed and sparsely vegetated substrates preferred for nesting (USFWS 2009a; USFWS 2009b; ODWC 2011). All piping plover populations face increasing human disturbance (i.e., development and recreation) during migration and in their wintering range. Human presence near nesting sites may inhibit courtship, incubation, brooding, and impact nesting and foraging activities (USFWS 2009b). Drought may also be a factor in decreases in the overall numbers of the Northern Great Plains population (Elliott-Smith and Haig 2004). Finally, predation is another notable threat to piping plover survival. Predators include, but are not limited to, gulls, American kestrels, great blue herons (*Ardea herodias*), American crows, owls, coyotes, foxes, skunks, raccoons, dogs, cats, snakes, and humans (Elliott-Smith and Haig 2004; USFWS 2009a; Tern & Plover Conservation Partnership 2013).

5.27.4 Potential Presence in the Action Area

Definition of the Action Area

The piping plover Action Area has been defined as the entire project disturbance footprint (temporary and permanent) plus an additional 0.25-mile buffer where the Project traverses connected waterbodies of Optima Lake in Texas County, Oklahoma. The Project is not within 0.25 miles of the lake itself; however, AC Transmission Line (NE-2) crosses the Beaver (also called North Canadian) River approximately five miles west of the lake. The 0.25-mile Action Area will be applied at this location because the Beaver River is the source of water for Optima Lake and may provide similarly suitable habitats for potential, albeit rare, piping plover breeding in the area. The 0.25-mile buffer is consistent with identified buffers for breeding piping plovers in the recently released biological opinion for the proposed Keystone XL pipeline, a long linear energy development project in the Great Plains (USFWS 2013b). Outside of the Beaver River crossing by AC Transmission Line NE-2, the Action Area would include the project disturbance footprint where possible migratory stopover habitat occurs, i.e., reservoir shorelines, natural lakes, rivers, emergent wetlands, industrial ponds, and fish farms (Elliott-Smith and Haig 2004).

Presence in the Action Area Based on Existing Data

The Northern Great Plains population of the piping plover breeds to the north of the Project; however, the species has twice (1987 and 1988) been documented breeding at Optima Lake in Texas County, Oklahoma (see Figure 5.27-1, "Potential Presence of Piping Plover in the Action Area") (Boyd 1991; USFWS 2013a). This is the only known potential breeding location of the piping plover in the vicinity of the Project. Optima Lake is approximately one mile from AC Transmission Line E-1 at its closest point. AC Transmission Line NE-2 crosses the Beaver River, which is the source of water for Optima Lake, approximately five miles west of the lake.

The species is believed to fly directly to and from its breeding grounds and wintering grounds, and are rarely seen at seemingly suitable inland stopover locations (Elliott-Smith and Haig 2004). However, they do have the potential to occur near inland reservoirs, rivers, and other aquatic habitats anywhere in the Project area during spring and fall migration (see Figure 5.27-1, "Potential Presence of Piping Plover in the Action Area"). According to eBird (2013) data (up to and including November 2013), a number of individuals have been observed during spring and fall migration in Project counties and adjacent counties. In Oklahoma, 65 individuals were recorded between 1976 and 2013. Spring observations occurred between April 12 and May 8, while fall observations occurred between July 13 and September 3. In Arkansas, 132 individuals were recorded between 1973 and 2013. These observations were recorded primarily during fall migration (July 10 to September 13) with only three birds being recorded during spring (April 17 to May 17). In Tennessee, 25 individuals were recorded between 1953 and 2000, and all but one of these birds were recorded during the fall migration (July 5 to September 24). The single spring record occurred on May 7. The USFWS (2014) also reports a single migrant in Shelby County in 2010. There are no recorded observations in the Texas Panhandle.

Additional Desktop/Field Analyses

Additional desktop and/or field analyses were not conducted, as piping plovers are rare breeders and migrants in the Project vicinity.

5.27.5 Direct and Indirect Impacts

Direct Mortality/injury

Injuries and/or mortalities could occur as a direct result of Project activities. Piping plovers are generally very agile flyers and would be able to avoid Project equipment and structures. Breeding piping plovers are rare in the vicinity of the Project, but they did breed at Optima Lake in Texas County, Oklahoma in 1987 and 1988 (Boyd 1991). In the unlikely event that piping plovers breed in the vicinity of the Project near Optima Lake or connected waterbodies, eggs and young birds would be susceptible to direct mortality or injury by equipment. Mortalities and injuries to eggs and chicks could also occur as a result of Project personnel foot traffic. Similarly, adults may suffer direct mortality or injury while defending their nests or chicks. Similarly, collisions with vehicles traveling along access roads or Project ROWs during migration are possible and could directly cause mortalities and/or injuries (Sporer et al. 2013). Mortalities and/or injuries could also directly result from herbicide use for weed control, as well as fuel and other chemical spills, if birds come in direct contact with the contaminant or indirectly if their food sources are contaminated. Mortalities associated with Project personnel, vehicles, and construction equipment are not expected to occur, as breeding is rare and the Project will avoid ground disturbance in potential nesting (i.e., Optima Lake).

Piping plover collisions with power lines are possible during operations and maintenance of the Project. They may be more susceptible to collisions with lines spanning waterbodies, as they inhabit aquatic habitats, particularly in areas where they breed. A mortality associated with a power line collision has been documented in the Northern Great Plains (i.e., North Dakota) during the breeding season (Sporer et al. 2013). Mortalities and injuries resulting from power line collisions would be considered long-term (or permanent relative to the life of the Project) impacts on piping plovers. The magnitude of the impacts would be dependent on two factors, including the implementation of protection measures (see Section 5.27.6, "Protection Measures") to reduce collisions and the numbers of collisions occurring. Potential piping plover collisions with the Project would be highly unlikely, as the species has never been documented breeding in the Action Area and has rarely been documented in the Project area during migration. The already negligible potential for piping plover collisions with the Project is reduced further by the protection measures (e.g., GE-2 in Section 5.27.6.1, "Environmental Protection Measures") that would be implemented.

Sensory Disturbance

Direct impacts from sensory disturbance also are possible, as noise, vibrations, and human presence resulting from Project activities could cause displacement or avoidance of areas by migrating plovers, or nest abandonment by breeding adults in the unlikely event that piping plovers breed in close proximity to the Project near Optima Lake (Elliott-Smith and Haig 2004; USFWS 2009b). Stress and displacement or avoidance associated with sensory disturbances take time and energy away from important activities like foraging, reproduction, and parental care. As a result, individuals and their young may exhibit a reduction in overall fitness, and may be more susceptible to illness and predation. Project-related sensory disturbance impacts are expected intermittent and short-term, occurring during work hours and ceasing after Project activities have moved from the vicinity of resting and foraging areas. Breeding is extremely rare in the vicinity of the Project; therefore, sensory disturbances are not likely to affect piping plovers breeding. In the unlikely event that a breeding pair was observed in the vicinity of the Project, Clean Line would consult the USFWS to determine actions to implement to prevent sensory disturbance during nesting. It is possible that migrating piping plovers could be disturbed by Project activities; however, these direct impacts are expected to be short term.

Habitat Loss/Alteration

Impacts related to habitat loss or alterations are not expected to occur, as the Project will avoid ground disturbance in potential suitable nesting (i.e., Optima Lake) and known stopover habitats. Similarly, avoidance of nesting habitat due to the presence of Project personnel and equipment and permanent structures will likely be avoided or substantially reduced by the Project's efforts to site Project facilities away from potential nesting habitat.

Increased Predation

Predation of piping plovers could indirectly increase as a result of several elements of the Project. Power lines and structures can provide hunting perches for corvids and raptors, particularly in open habitats where very few elevated perches exist (Lammers and Collopy 2007). Perching on structures is believed to increase hunting efficiency due to the increased visibility of the surrounding area. Predation associated with structure perches could begin with the construction phase of the Project; however, this impact would be expected to be greater during the operations and maintenance phase, as the full HVDC line and AC lines would be constructed and potentially provide perches for decades (i.e., the life of the Project, or a permanent impact). Known avian predators of piping plovers that may benefit from these artificial perches include, but are not limited to, American kestrels and American crows (Elliott-Smith and Haig 2004; Tern & Plover Conservation Partnership 2013]). This impact would be most likely to occur during spring or fall migration, as breeding is extremely rare in the vicinity of the Project with only two historic records near Optima Lake, Oklahoma.

Predators may also indirectly increase due to trash from Project personnel. Trash could attract predators, including, but not limited to, gulls, crows, and raccoons. This would be a short-term impact that would end with the removal of the trash source. Clean Line would practice good housekeeping to avoid the disposal of trash in Project areas; therefore, trash-related increases in predation on piping plovers are not expected to occur.

Piping plovers are rare breeders, and do not commonly stopover in the Action Area. Their low likelihood of occurrence in the Action Area in combination with the implementation of protection measures should result in negligible to minimal Project-related impacts associated with increased predation pressure.

5.27.6 Protection Measures

5.27.6.1 Environmental Protection Measures

The following EPMs—general (GE); fish, vegetation, and wildlife (FVW); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on piping plovers.

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety, and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits
- (GE-2) – Clean Line will design, construct, maintain, and operate the Project following current APLIC guidelines to minimize risk of avian mortality.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies, and groundwater wells, or as otherwise required by federal, state, or local regulations.
- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.
- (GE-20) – Clean Line will conduct construction and scheduled maintenance activities on the facilities during daylight hours, except in rare circumstances that may include, for example, to address emergency or unsafe situations, to avoid adverse environmental effects, to minimize traffic disruptions, or to comply with regulatory or permit requirements.
- (GE-21) – Clean Line will maintain construction equipment in good working order. Equipment and vehicles that show excessive emissions of exhaust gasses and particulates

due to poor engine adjustments or other inefficient operating conditions will be repaired or adjusted.

- (GE-22) – Clean Line will impose speed limits during construction for access roads (e.g., to reduce dust emissions, for safety reasons, and for protection of wildlife).

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-2) – Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-4) – If construction- and/or decommissioning-related activities occur during the migratory bird breeding season, Clean Line will work with USFWS to identify migratory species of concern and conduct pre-construction surveys for active nests for such species. Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.

Waters, Wetlands, and Floodplains EPMs:

- (W-2) – Clean Line will identify, avoid, and/or minimize adverse effects to wetlands and waterbodies. Clean Line will not place structure foundations within the OHWM of Waters of the United States.
- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.
- (W-7) – Clean Line will locate spoil piles from foundation excavations and fiber optic cable trenches outside of streamside management zones.
- (W-9) – Clean Line will design converter station sites to avoid adverse changes to the base flood elevation within the 100-year floodplain.
- (W-10) – Clean Line will minimize fill for access roads and structure foundations within 100-year floodplains to avoid adverse changes to the base flood elevation.

5.27.6.2 Species-specific Measures

Piping plovers only have two historic breeding records in the vicinity of the Project, which occurred at Optima Lake in 1987 and 1988 (Boyd 1991; USFWS 2013a). Furthermore, they are not regularly recorded migrating through the Project and its vicinity. Therefore, it is highly unlikely that piping plovers will breed in or near the Project. As such, Clean Line proposes to rely on their EPMs to minimize potential Project impacts on piping plovers.

5.27.7 Effects Determination

The Project avoids (i.e., is sited greater than 0.25 miles from) historic piping plover nesting areas at Lake Optima in Texas County, Oklahoma. Piping plovers are rare breeders at Lake Optima and have not been documented breeding anywhere else in the Project area. They also are believed to travel directly to and from their breeding and wintering grounds, with limited migration records in the Project area during spring and fall migration. Their risk of collision with Project power lines is highly unlikely because of their very limited presence during migration and historic lack of presence during the breeding season in the Action Area. Despite being a rare migrant, they may occur anywhere in the vicinity of the Project during migration at reservoir shorelines, natural lakes, rivers, marsh wetlands, industrial ponds, and fish farms and would be subject to sensory disturbances if a migrant bird occurred in proximity to construction or right-of-way maintenance activities.

Taking into consideration the species' relatively rare presence in the Project area, the proposed Project design as well as the implementation of the aforementioned EPMs and species-specific measures proposed by Clean Line, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project "may affect, but is not likely to adversely affect" the piping plover.

The Project will not be constructed in the vicinity of critical habitat and "will not destroy or adversely modify" critical habitat for the piping plover.

5.28 Red Knot (*rufa* subspecies)

On January 12, 2015, the rufa subspecies of the red knot (*Calidris canutus rufa*; hereafter referred to as "rufa red knot") was officially listed as threatened under the ESA (USFWS 2014a). A proposal to designate critical habitat for the subspecies is still forthcoming.

5.28.1 Natural History

The rufa red knot is a potential migrant in the interior United States and does not breed or winter in the vicinity of the Project; therefore, discussion of their breeding and wintering range, habitats, and behaviors is limited.

Range

There are six recognized subspecies of red knots, all of which breed in the Arctic (Ahlenius 2010; USFWS 2013a). Three of these subspecies occur in North America, but are not fully distinct at the genetic level, based on existing research (Ahlenius 2010; Baker et al. 2013; USFWS 2013a). The rufa red knot breeds in the central Canadian Arctic and winters along the Atlantic and Gulf of Mexico coasts in North America, in the Caribbean, and along the north and southeast coasts of South America. Migration for this subspecies generally follows the Atlantic Coast; however, relatively small numbers of rufa red knots occur in the interior United States during both spring and fall migration (Baker et al. 2013; eBird 2013).

Migration Ecology

Rufa red knots are long-distance migrants capable of making non-stop flights of over 1,500 miles and traveling up to 19,000 miles annually (Baker et al. 2013; USFWS 2013a, 2013b). Individuals may winter as far south as Tierra del Fuego in Argentina and Chile. Prior to undertaking long migration flights, rufa red knots undergo a series of physiological changes, which include substantial fat storage and changes in metabolic rates; decrease in size of leg muscles, gizzard, stomach, intestines, and liver; and increases in heart and pectoral muscle size (Baker et al. 2013; USFWS 2013a). When rufa red knots arrive at a stopover site, they are not able to feed maximally until their digestive organs regenerate, which can take several days (USFWS 2013a). Therefore, they need stopover sites that are rich in easily digested food to quickly regain the necessary body fat stores to continue their migration (USFWS 2013a, 2013b). On the Atlantic Coast, horseshoe crab (*Limulus polyphemus*) eggs and mussel beds are important food sources (USFWS 2013b). Rufa red knots may more than double their weight during a stopover of approximately 10 to 14 days (USFWS 2013a, 2013b).

Rufa red knots typically depart for migratory flights as single-species flocks on sunny days a few hours before dusk (Baker et al. 2013; USFWS 2013a). Migrating flocks are tightly formed and often greater than 50 birds, and are believed to fly during both day and night depending on the distance of flight segments (USFWS 2013a). Rufa red knots depart their breeding grounds between mid-July and the end of August, with females leaving first, followed by males, and then juveniles (USFWS 2013a). While many rufa red knots migrate along the Atlantic Coast, tracking of birds that winter in Texas revealed that they used the Central Flyway when migrating both north and south (Newstead et al. 2013; USFWS 2013a). During fall migration, rufa red knots typically leave staging areas in Hudson Bay in early July and fly overland to the Gulf Coast, using stopover locations in the Northern Great Plains along the way. In the spring, they depart Texas in the latter half of May and fly directly to their Northern Great Plains stopover approximately 1,600 to 2,000 miles north. Rufa red knots spend between 13 and 22 days at the Northern Great Plains stopover. Records of inland stopovers in Kansas, primarily at Cheyenne Bottoms WMA, range from April 9 to June 3 (peaks in the latter half of May) in the spring, and July 24 to September 26 (an outlier of October 16) in the fall (Thompson et al. 2011; Baker et al. 2013).

Rufa red knots are largely dependent on quality habitat at a few key staging areas between their wintering and breeding grounds (USFWS 2013a). The conditions at these staging areas factor heavily in the annual cycle and survival of rufa red knots. These stopover sites are primarily along the Atlantic Coast; however, relatively small numbers occur annually across the interior United States (Baker et al 2013; USFWS 2013a). Most interior rufa red knot migration records occur near the Great Lakes, although each interior state has multiple documented observations (eBird 2013; USFWS 2013a). On the coasts, rufa red knots use marine and estuarine habitats with expanses of exposed intertidal sediments, but information on non-coastal stopover habitats is lacking (USFWS 2013a). Roosting habitat at stopovers are usually close to feeding areas and provided protection from predators and human disturbance. Flights between resting and foraging areas are typically swift and direct (Baker et al. 2013).

The rufa red knot specializes in eating hard-shelled mollusk, but will supplement their diet with softer invertebrates when they are readily accessible (Baker et al. 2013; USFWS 2013a). Rufa red knots swallow their prey whole, thus, there is a limit to the size of the prey they can consume (less than 1.2 inches in circumference). Furthermore, they are limited to only shallow-buried prey that occur within roughly the top one inch of sediment. Their dietary needs and long-distance migrations necessitate the need to take advantage of seasonally abundant food sources at stopover sites (USFWS 2013a). As such, migrating rufa red knots tend to concentrate where food resources are abundant, although they may be widely distributed in small numbers where suitable habitat exists.

Predation

Predators in non-breeding areas (i.e., migration and wintering sites) are most commonly large falcons like the peregrine falcon (*Falco peregrinus*), but also includes smaller falcons, harriers, accipiters, short-eared owls (*Asio flammeus*), and great black-backed gulls (*Larus marinus*). Rufa red knots find safety in flocks, often performing synchronous aerobatic flight maneuvers in tight formations, to avoid predators during non-breeding periods. Rufa red knots selection of resting areas may be influenced by raptor predation as well (Baker et al. 2013).

5.28.2 Population Status

Prior to the 1980s, accounts of rufa red knot populations were primarily qualitative or localized estimates (USFWS 2013a). Rufa red knots are believed to have been extremely abundant in the early 1800s, with numbers declining precipitously from the mid-1800s, due to intensive hunting, until the early 1900s, at which point numbers are believed to have started recovering. Systematic red knot survey efforts began in the 1980s across some of their range, but survey data are still patchy in many parts of their range. Population estimates for breeding birds are not available, because rufa red knots are thinly distributed across a vast and remote area in the Arctic. Similarly, regular surveys of fall birds are limited because rufa red knots are generally less concentrated during the fall than in winter or spring. Winter counts are especially useful, because the birds generally remain within a given area for a longer period of time than during migration.

Long-term trends offer more meaningful characterizations of red knot populations, due to considerable fluctuations in annual counts (USFWS 2013a). The best available data for several important sites indicate that rufa red knot abundance has declined, potentially steeply, since the 1980s, but the rate of decline appears to have stabilized in the last few years. The USFWS (2013a) summarized available survey data from areas regularly used by large numbers of rufa red knots in spring, fall, and winter. They expressed high confidence in two data sets from key areas: Tierra del Fuego, Argentina/Chile (wintering), and Delaware Bay (spring migration). Tables 5.28-1, “Aerial Counts of Rufa Red Knots in Tierra del Fuego (Argentina/Chile) in Winter (1985 – 2012),” and 5.28-2, “Peak Counts of Rufa Red Knots in Delaware Bay from Spring Aerial and Ground Surveys (1991 – 2012)” represent these survey data as summarized in USFWS (2013a).

Table 5.28-1
Aerial Counts of Rufa Red Knots in Tierra del Fuego (Argentina/Chile) in Winter (1985 – 2012)

Year	Count
1985	53,232
2000	51,255
2001	29,745[a]
2002	27,242
2003	29,915
2004	30,778
2005	17,653
2006	17,211
2007	17,360
2008	14,800
2009	17,780
2010	16,260
2011	9,850
2012	14,200

Note:

(a) Only the single largest wintering area (Bahia Lomas) and one small adjacent site were surveyed in 2001.

Table 5.28-2
Peak Counts of Rufa Red Knots in Delaware Bay from Spring Aerial and Ground Surveys (1991 – 2012)

Year	Count	Year	Count
1981[a]	67,450	1998	50,360
1982	95,530	1999	49,805
1983	16,859	2000	43,145
1986	58,156	2001	36,125
1987	38,790	2002	31,695
1988	34,750	2003	16,255
1989	95,490	2004	13,315
1990	45,860	2005	15,345
1991	27,280	2006	13,445
1992	25,595	2007	12,375
1993	44,000	2008	15,395
1994	52,055	2009	24,000[b]

Table 5.28-2
Peak Counts of Rufa Red Knots in Delaware Bay from Spring Aerial and Ground Surveys (1991 – 2012)

Year	Count	Year	Count
1995	38,600	2010	14,475
1996	19,445	2011	12,804
1997	41,855	2012	25,488[b]

Notes:

(a) Only New Jersey was surveyed in 1981. For reference, the total numbers of red knots in Delaware Bay was relatively evenly distributed between New Jersey and Delaware from 1986 to 1992, suggesting that the true peak count for the bay could have been roughly double the number recorded in 1981.

(b) Ground counts. For 2009, the actual peak ground count was 27,187, but was reported as 24,000 as the low end of an estimated 10% error range. The peak ground count in 2012 was also adjusted down (from roughly 29,400 to 25,458) based on concerns that some flocks in New Jersey were double counted.

5.28.3 Current Threats

Climate change may be one of the stronger threats to rufa red knots (Baker et al. 2013; USFWS 2013a). Climate change could reduce or change their breeding, migrating, and wintering habitats. This subspecies is believed to have low genetic diversity as result of past climate-driven population bottlenecks, and may not have the capacity to adapt well to the potential habitat changes (USFWS 2013a). Sea level rise is expected to be greatest in polar and temperate zones, where breeding, migration, and wintering sites may be at risk (Baker et al. 2013). Climate change may also affect prey availability and the prevalence of disease and parasites (USFWS 2013a). Alterations in prey availability may ultimately affect the timing of migration to coincide with seasonally abundant food sources. Similarly, changes in the frequency, intensity, and timing of inclement weather also could pose serious threats to the subspecies.

Habitat loss and alteration also are a major threat to rufa red knots. In addition to sea level rise, rufa red knot habitats are threatened by shoreline stabilization and shoreline development (USFWS 2013a). A substantial portion of the United States coastline in the rufa red knot's range has already been developed over the last century, and long-term beach erosion issues associated with shoreline stabilization and other human activities degrade remaining suitable habitats. Habitat is also degraded by beach cleaning activities, the introduction and spread of invasive vegetation, and agriculture and aquaculture (e.g., clam and shrimp farming, cattle grazing).

Declining food availability at stopover sites may have major implications for the survival and reproduction of the rufa red knot (USFWS 2013a; USFWS 2013b). Commercial harvests of shellfish have been connected to emigration, local declines in recruitment and survival, prey switching, and physiological changes in migration and winter habitats of red knot subspecies in Europe (USFWS 2013a). Similarly, the commercial harvest of horseshoe crabs has been implicated as a primary factor in the decline of rufa red knots. Regulation of the horseshoe crab harvest and conservation actions resulted in increased horseshoe crab populations in the early 2000s, although population growth has leveled off since approximately 2005. The existing horseshoe crab harvest is not considered a threat, as its management is tied to red knot populations through scientific modeling efforts. Other factors also may affect food availability, including prey disease, anthropogenic sediment alteration, invasive species, ocean acidification, temperature changes, and other water quality changes associated with climate change. Similarly, asynchronous timing of migration with ephemeral, cyclically abundant food sources at stopover sites may potentially threaten rufa red knot survival and productivity.

Human disturbance at migration and wintering areas also is considered a major threat to the rufa red knot (USFWS 2013a; USFWS 2013b). People, dogs, vehicles, boats, and aircraft all contribute to the disturbance of rufa red knots, particularly in areas where recreational activities and rufa red knots are both concentrated. These disturbances may degrade habitats, preclude use of preferred habitats, and disrupt important foraging and resting opportunities for rufa red knots. The disruption of these activities and avoidance of preferred habitats reduces the likelihood that rufa red knots will have the energy stores required to complete long-distance migratory flights, and may also affect reproduction and other important biological processes. These impacts are likely to exacerbate other threats to rufa red knots.

Wind energy development (terrestrial and offshore) has increased in recent years, and is expected to continue growing. There are no known rufa red knot mortalities to date; however, the likelihood of collisions may be increasing as more turbines are constructed in coastal and offshore environments, particularly those along rufa red knot migratory routes. The presence of turbines may also alter migratory pathways and displace rufa red knots from preferred habitats. Currently, the effects of wind energy development are not considered to be a threat at the subspecies level, but this could change, especially if wind facilities and associated infrastructure are constructed in or near key stopover or wintering areas (USFWS 2013a).

Environmental contaminant spills and leaks are a threat to rufa red knots throughout their migratory and wintering range (USFWS 2013a). Both oil spills and clean-up response activities can affect the rufa red knot and its habitat. Several key wintering and stopover areas are in proximity to large-scale petroleum extraction and/or transportation operations. Petroleum is toxic to birds and can directly cause mortality or reduced fitness. Rufa red knots are exposed to a variety of contaminants; however, exposure risks are localized and there is no evidence to suggest exposure poses a threat to rufa red knots.

Historically, hunting was a substantial threat to rufa red knots in the United States. Prior to the enactment of the Migratory Bird Treaty Act of 1918, red knots were subject to intensive hunting for market and sport (Baker et al. 2013; USFWS 2013a). Shorebird hunting continues to occur in known rufa red knot range in parts of the Caribbean and South America. Information regarding levels of mortality from hunting are lacking, but rufa red knots are hunted for sport in Barbados and commonly killed for food in parts of South America, especially the Guianas. Rufa red knot hunting is prohibited by law in a number of Caribbean and South American countries, although illegal hunts may still occur.

Predators are also a potential threat to rufa red knots. Predation on breeding grounds is variable depending on other ecological factors, including the cyclic availability of arctic rodents (USFWS 2013a). Predation pressure can reduce reproductive output and influence nesting chronology and distribution. During migration, a number of avian predators and some terrestrial predators may take rufa red knots; however, direct mortality of rufa red knots from predation is not expected to be a notable threat. The presence of predators, on the other hand, may exacerbate impacts from other threats on rufa red knots, as it affects their habitat use and migration strategies. Rufa red knots may avoid areas where raptors are present, which could affect their feeding behavior and, ultimately, their rates of weight gain. In fact, rufa red knot usage of important migration stopover habitats with high food availability (i.e., horseshoe crab eggs) has been shown to decrease with the increasing presence of peregrine falcons (USFWS 2013a). Predator presence may also limit the duration of their stopovers.

5.28.4 Potential Presence in the Action Area

Definition of the Action Area

The Action Area for rufa red knots is considered to be the project disturbance footprint within suitable rufa red knot foraging or roosting habitats. Rufa red knots are susceptible to disturbance from anthropogenic sources at migratory stopover locations. To date, there is no known research that indicates at what distance rufa red knots are affected by human disturbance. As such, it is assumed that any anthropogenic activities within the project disturbance footprint could potentially disturb rufa red knots if they are present.

Presence in the Action Area Based on Existing Data

Most rufa red knots migrate along the Atlantic Coast during spring and fall; however, every interior state has multiple documented migration records and recent research has shown that birds wintering in Texas fly to and from breeding grounds via the Central Flyway (eBird 2013; Newstead et al. 2013; USFWS 2013a). The Project traverses portions of both the Central and Mississippi Flyways, and potentially lies in the migratory path of the relatively small number of rufa red knots that migrate through the interior United States. Rufa red knots could occur at the Project wherever aquatic habitats with exposed sediments and abundant, readily accessible aquatic invertebrates exist (Baker et al. 2013; USFWS 2013a). There are no known primary stopover sites in the vicinity of the Project, and rufa red knots migrating through the Central Flyway are believed to depart the Texas coast and stopover in the Northern Great Plains and Hudson Bay areas before reaching their Arctic breeding grounds (Newstead et al. 2013; USFWS 2013a). Therefore, rufa red knots stopping over in the vicinity of the Project are expected to be a rare occurrence with a relatively few individuals.

Rufa red knots are known to or are believed to occur in all Project counties in Oklahoma, according to the USFWS (2014b). County-level ranges have not been defined for Arkansas and Tennessee, and the USFWS does not believe the species occurs in the Texas Panhandle.

According to eBird (2013) data, there are four documented sightings of rufa red knots in Oklahoma, 17 in Arkansas, and five near Memphis, Tennessee (see Figure 5.28-1 “Potential Presence of Red Knot in the Action Area”). In Oklahoma, all observations were recorded between August 23 and September 5 from 1979 to 2012. One individual was recorded in the extreme southeastern part of the state in McCurtain County. At Salt Plains National Wildlife Refuge, which is approximately 30 miles north of the Project, two rufa red knots were recorded in 2011, and one in 2012. A single individual was observed in 1979 approximately 15 miles north of the Project in southern Tulsa County near Bixby.

In Arkansas, many of the documented sightings have occurred just to the east of Little Rock on minnow/fish farms, approximately 30 miles south of the Project. Eleven sightings of 12 total individuals in Arkansas have been documented at these farms between September 4 and 20 from 1986 to 2008. Four of the sightings are likely the same bird, as they were all recorded in the same location over five days in 2007. Two spring observations, totaling four birds, have been recorded in White County near the Little Red River, approximately 10 to 20 miles south of the Project. Both observations were recorded in late May in 1995 and 2010. Four additional sightings of rufa red knots were recorded more than 100 miles south of the Project in southeastern Arkansas, all in mid-August (eBird 2013).

There are five documented observations of rufa red knots in the Memphis metropolitan area of Tennessee, which is approximately 20 miles south of the Project. These were all single birds observed in the fall (August 6 to November 3) from 1954 to 2011. Four of the five were observed along the Mississippi River (eBird 2013).

Additional Desktop/Field Analyses

Additional desktop and/or field analyses were not conducted, as rufa red knots are rare during spring and fall migration in the Project vicinity.

5.28.5 Direct and Indirect Impacts

Direct Mortality/Injury

Injuries and/or mortalities could occur as a direct result of Project activities. Rufa red knot mortalities would be expected to have minimal, short-term impacts, as they rarely occur in the vicinity of the Project. Migrating rufa red knots are very mobile and would be able to avoid most Project equipment; however, collisions with vehicles traveling along access roads or Project ROWs are possible in habitats where rufa red knots may potentially stopover during spring and fall migrations. Mortalities associated with Project personnel, vehicles, and construction equipment are not expected to occur, as rufa red knots are rare migrants in the vicinity of the Project and protection measures will be employed to avoid such impacts (see Section 5.28.6, "Protection Measures"). Mortalities and/or injuries could also directly result from herbicide use for weed control, as well as fuel and other chemical spills, if birds come in direct contact with the contaminant. Similarly, spills could cause mortality or illness indirectly if water or food sources are contaminated. Protection measures will be implemented to prevent fuel and other chemical spills in all habitats, particularly aquatic habitats.

Rufa red knot collisions with power lines are possible during operations and maintenance of the Project. Rufa red knots may be more susceptible to collisions with lines spanning waterbodies, as they forage and roost in aquatic habitats during migration. Rufa red knots also exhibit several behavioral traits indicative of birds more susceptible to collisions, including night flying, flying in tightly packed flocks, and repeated flights to and from foraging/resting areas (APLIC 2012). Inclement weather may exacerbate the collisions risks, by reducing visibility and flying abilities. Despite these potential collision risk factors, there are no published accounts of rufa red knot mortalities attributed to collisions with power lines. Mortalities and injuries resulting from power line collisions would be considered long-term (or permanent relative to the life of the Project) impacts on rufa red knots. The lack of documented collisions with power lines, the fact that they are rarely documented in the vicinity of the Project, and the EPMs (see GE-2 in Section 5.28.6, "Protection Measures") that would be implemented by the Project indicate that rufa red knot collisions with Project lines are highly unlikely.

Sensory Disturbance

Direct impacts from sensory disturbance also are possible, as noise, vibrations, and human presence could cause stress and/or displacement or avoidance of migration stopover areas (USFWS 2013a, 2013b). Sensory disturbances of rufa red knots take time and energy away from feeding and resting, both of which are vital activities during migration stopovers (Baker et al. 2013; USFWS 2013a, 2013b). As a result, rufa red knots may not restore essential energy reserves necessary to complete their long-distance migrations, which would affect their health and potentially their survival. Project-related sensory disturbance impacts are expected to be intermittent and short-term, occurring during work hours and ceasing after Project activities have moved from the vicinity of resting and/or foraging areas. Rufa red knots are rarely recorded in the vicinity of the Project and Protection measures (see Section 5.28.6, "Protection Measures") would be implemented; therefore, impacts associated with sensory disturbances are expected to be negligible to minimal.

Habitat Loss/Alteration

Modification or removal of aquatic habitats with exposed sediments and abundant, readily accessible invertebrates (particularly mollusks) could negatively and indirectly impact rufa red knots by reducing foraging opportunities during migration (USFWS 2013a). Impacts on rufa red knots associated with habitat loss or alteration are not expected to occur, as the species is rarely recorded in the vicinity of the Project. Similarly, the Project will avoid ground disturbance in suitable foraging or resting habitats.

Increased Predation

Predation of rufa red knots could occur indirectly as a result of two elements of the Project. Power lines and structures can provide hunting perches for avian predators, particularly in open habitats where very few elevated perches exist (Lammers and Collopy 2007). Perching on structures is believed to increase hunting efficiency due to the increased visibility of the surrounding area. Predation associated with structure perches could begin with the construction phase of the Project; however, this impact would be expected to be greater during the operations and maintenance phase, as the full HVDC line and AC lines would be constructed and could potentially provide perches for decades (i.e., the life of the Project). Even if avian predators were not able to successfully prey upon rufa red knots, their presence could disrupt foraging and resting activities and cause displacement and/or avoidance of suitable habitats (Baker et al. 2013; USFWS 2013a). The primary predators of rufa red knots in non-breeding habitats are raptors (Baker et al. 2013).

Gulls, crows, and mammalian predators may increase due to trash from Project personnel. These types of predators are not believed to be very successful in preying on non-breeding rufa red knots; however, they may still disturb rufa red knots and disrupt their important resting and foraging activities (USFWS 2013a). Clean Line would practice good housekeeping to avoid the disposal of trash in Project areas; therefore, trash-related increases in predation on piping plovers are not expected to occur.

Project-related increases in predation are expected to have negligible to minimal impacts on rufa red knots, because the species is rarely recorded in the Project vicinity and protection measures (see Section 5.28.6, "Protection Measures") would be implemented to reduce and/or avoid potential impacts.

5.28.6 Protection Measures

5.28.6.1 Environmental Protection Measures

The following EPMs—general (GE); fish, vegetation, and wildlife (FVW); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on red knots.

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety, and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits
- (GE-2) – Clean Line will design, construct, maintain, and operate the Project following current APLIC guidelines to minimize risk of avian mortality.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.

- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies, and groundwater wells, or as otherwise required by federal, state, or local regulations.
- (GE-15) – Waste generated during construction or maintenance, including solid waste, petroleum waste, and any potentially hazardous materials will be removed and taken to an authorized disposal facility.
- (GE-20) – Clean Line will conduct construction and scheduled maintenance activities on the facilities during daylight hours, except in rare circumstances that may include, for example, to address emergency or unsafe situations, to avoid adverse environmental effects, to minimize traffic disruptions, or to comply with regulatory or permit requirements.
- (GE-21) – Clean Line will maintain construction equipment in good working order. Equipment and vehicles that show excessive emissions of exhaust gasses and particulates due to poor engine adjustments or other inefficient operating conditions will be repaired or adjusted.
- (GE-22) – Clean Line will impose speed limits during construction for access roads (e.g., to reduce dust emissions, for safety reasons, and for protection of wildlife).

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-2) – Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.
- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-4) – If construction- and/or decommissioning-related activities occur during the migratory bird breeding season, Clean Line will work with USFWS to identify migratory species of concern and conduct pre-construction surveys for active nests for such species. Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.

Waters, Wetlands, and Floodplains EPMs:

- (W-2) – Clean Line will identify, avoid, and/or minimize adverse effects to wetlands and waterbodies. Clean Line will not place structure foundations within the OHWM of Waters of the United States.
- (W-4) – If used, Clean Line will selectively apply herbicides within streamside management zones.

- (W-7) – Clean Line will locate spoil piles from foundation excavations and fiber optic cable trenches outside of streamside management zones.
- (W-9) – Clean Line will design converter station sites to avoid adverse changes to the base flood elevation within the 100-year floodplain.
- (W-10) – Clean Line will minimize fill for access roads and structure foundations within 100-year floodplains to avoid adverse changes to the base flood elevation.

5.28.6.2 Species-specific Measures

Rufa red knots are rarely observed in the vicinity of the Project, as they are believed to largely pass over Oklahoma, Arkansas, and Tennessee when traveling between wintering grounds and interior stopover locations in the Northern Great Plains (Newstead et al. 2013; USFWS 2013a). As such, Clean Line proposes to rely on their EPMs to minimize potential Project impacts on rufa red knots.

5.28.7 Effects Determination

Rufa red knots are rarely recorded in the vicinity of the Project. Furthermore, the Project will implement the aforementioned protection measures and will avoid the types of aquatic habitats that may serve as suitable migration stopover sites for rufa red knots. These factors, plus the lack of documented collisions of rufa red knots with power lines, indicate that collisions with Project components are highly unlikely. Still, rufa red knots may occur, albeit rarely, in suitable habitats anywhere in the vicinity of the Project during spring and fall migrations.

Taking into consideration the rarity of this species within the project area, the proposed Project design, as well as the implementation of the aforementioned EPMs and species-specific measures proposed by Clean Line, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project "may affect, but is not likely to adversely affect" the rufa red knot.

The rufa red knot does not currently have designated critical habitat; therefore, the Project "will not destroy or adversely modify" critical habitat.

5.29 Sprague's Pipit

The Sprague's pipit (*Anthus spragueii*) was petitioned for listing under the ESA by WildEarth Guardians in October of 2008 (USFWS 2010). The USFWS acknowledged the petition in December 2008 and deemed that emergency temporary action was not necessary, but that a 90-day finding would be completed for the species in the following fiscal year. The USFWS received notice of intent to sue in early 2009 before publishing their 90-day finding in December 2009. The USFWS and WildEarth Guardians reached a settlement in May 2010 and, as a result, the USFWS submitted its 12-month finding on the petition to list Sprague's pipit on September 15, 2010. The USFWS determined that the Sprague's pipit listing as threatened or endangered was warranted, but was precluded due to higher priority actions. The species was added to the Candidate list and designation of critical habitat was delayed until a proposed listing rule is published. Sprague's pipit's listing priority number is 2, indicating that threats to the species are of high magnitude and imminent.

5.29.1 Natural History

Sprague's pipit may migrate through or winter in the vicinity of the Project but breeds in the Northern Great Plains. As such, discussion of their breeding range, habitats, and behaviors is limited.

Range

Sprague's pipit breeds in the Northern Great Plains, ranging from southwestern Manitoba to southeastern Alberta in Canada, south through central and eastern Montana, North Dakota, northern and central South Dakota, and northwestern Minnesota (Robbins and Dale 1999; eBird 2014). The species winters in Mexico as well as south-central and southeastern Arizona, southern New Mexico, Texas, southern Oklahoma, southern Arkansas, northwestern Mississippi, and south Louisiana in the United States (Robbins and Dale 1999). Winter birds are occasionally documented as far west as southern California, north to southern Kansas and Missouri, and in nearly all southeastern states (eBird 2014). In migration, Sprague's pipits may occur throughout the Great Plains between their breeding and wintering grounds, and rarely in southern California and in eastern states (Robbins and Dale 1999; eBird 2014). According to the Sprague's Pipit (Anthus spragueii) Conservation Plan (Jones 2010), the Sprague's pipit migration corridor includes South Dakota, Nebraska, Kansas, Oklahoma, and portions of the Texas Panhandle and eastern New Mexico.

Migration and Winter Ecology

The migration and wintering ecology of Sprague's pipit is poorly understood (USFWS 2010). The species migrates through the central Great Plains in April, although some individuals may not leave wintering grounds until early May (Robbins and Dale 1999). They arrive at their breeding grounds between the third week of April and mid-May. In the fall, the species returns to their wintering grounds through the central Great Plains from late September through early November. Sprague's pipits are diurnal, primarily solitary migrants, although they occasionally occur in loosely associated flocks. While they are associated with large tracts of native grassland on their breeding grounds, Sprague's pipits have also been observed along trails and roads, near water, and in pastures and sunflower fields during migration (USFWS 2010).

During winter, Sprague's pipits exhibit a strong preference for larger tracts of native grassland, as they do during breeding (Robbins and Dale 1999; USFWS 2010). They tend to avoid grasslands with notable shrub encroachment, and are not found in narrow strips of grassland along agricultural field borders (USFWS 2010). They are found in densely and sparsely vegetated grasslands, although their densities in grasslands on wintering grounds are positively associated with the density of grasses.

Predation

Predation of Sprague's pipits is poorly understood, especially during migration and winter. The existing knowledge is largely concentrated on the predation of nests and adults associated with nests. The most likely predators for Sprague's pipits during migration and winter are raptors and mammals (Robbins and Dale 1999).

5.29.2 Population Status

Sprague's pipit was described as widespread and abundant in the upper Missouri River basin during the late 1800s (Robbins and Dale 1999; USFWS 2010). Population estimates over the last half century are largely based on Breeding Bird Survey (BBS) data. Their secretive behavior and cryptic coloration make Sprague's pipits difficult to detect, and BBS occur along roads, which the species is most likely to avoid (USFWS 2010). A species-specific, range-wide survey effort has not been conducted. The Partners in Flight Science Committee (2013) estimated approximately 900,000 individuals range-wide, based on extrapolation of BBS data. Trend analysis of BBS data indicated a decline of 80% from 1966 to 2007, with an annual rate of decline of 3.9% (Jones 2010; Partners in Flight Science Committee 2013). The Canadian Wildlife Service conducts surveys similar to the BBS as part of its Grassland Bird Monitoring program. These surveys identify a 10.5% decline in the species from 1996 to 2004 in the core of the pipit's breeding range in Canada (Jones 2010; USFWS 2010). Analyses of Christmas Bird Count data from the winters of 1966/1967 through 2005/2006 showed a median decline of 3.23% annually, which is consistent with BBS results.

5.29.3 Current Threats

The greatest threat to Sprague's pipits is conversion of native grassland habitats (Robbins and Dale 1999; Jones 2010; USFWS 2010). Less than 30% of historic native grassland habitat in the Great Plains remains, and the conversion of these habitats are accelerating (Jones 2010; USFWS 2010). Research has largely been focused on breeding habitat, but winter habitat may also have substantial effects on the survival and fitness of Sprague's pipits (Robbins and Dale 1999; USFWS 2010). Agriculture has been the greatest contributor to the conversion of native grasslands in the Great Plains; however, factors including grazing, fire suppression, poorly timed mowing, and energy development also contribute. Oil, gas, and wind development, along with their associated roads and facilities, have increasingly removed and fragmented native prairie habitats (USFWS 2010).

The USFWS does not believe that natural levels of predation are a threat to continued existence of Sprague's pipit; however, predation has been documented as the leading cause of mortality in nestlings and fledglings (USFWS 2010). The predation risk may be unnaturally increased as native grassland habitats become increasingly more fragmented. Sprague's pipits build well concealed nests in tall, dense vegetation away from habitat edges (Robbins and Dale 1999; USFWS 2010). Reducing the sizes of grassland patches and increasing habitat edges may likely increase predation, as well as nest parasitism by brown-headed cowbirds (*Molothrus ater*), as cowbirds and many songbird predators are associated with habitat edges (USFWS 2010).

Other potential factors that may pose threats to Sprague's pipit include climate change as well as chemical use and harassment in agricultural fields (USFWS 2010). There is a great deal of uncertainty associated with these concerns, as little research has addressed them as they pertain to Sprague's pipits. Furthermore, Sprague's pipits are rarely associated with agricultural fields. As such, these are not considered substantial threats to the species at this time.

5.29.4 Potential Presence in the Action Area

Definition of the Action Area

Sprague's pipits may occur anywhere along the Project in suitable grasslands and pastures during migration and winter, generally between late September and early May (Grzybowski et al. 2009; eBird 2014). Research regarding anthropogenic disturbances affecting Sprague's pipits during migration or winter is virtually non-existent, as very little is known about the species during these periods. During winter and migration, Sprague's pipits are most often solitary, but sometimes occur in small, loose flocks (Robbins and Dale 1999; USFWS 2010). Given the limited knowledge base on the effects of disturbances on Sprague's pipit, and the fact that they are generally solitary and not defending territories, the Action Area is considered to be the entire project disturbance footprint, including all temporary and permanent areas, within grassland and pasture habitats.

Presence in the Action Area Based on Existing Data

According to Jones (2010), only the portions of the Project in Texas and Oklahoma fall within the Sprague's pipit migration corridor (see Figure 5.29-1, "Potential Presence of Sprague's Pipit in the Action Area"). Furthermore, the Project does not traverse Sprague's pipit winter range as defined by Jones (2010), the northern extent of which reaches extreme southern Oklahoma. Jones has defined what may be considered the species' typical range during migration and winter; however, observational data indicate that winter birds are sometimes documented as far north as southern Kansas and Missouri, and in nearly all southeastern states (eBird 2014). Similarly, Sprague's pipits are also occasionally recorded outside of Jones' (2010) defined migration corridor (eBird 2014).

Documented occurrences of Sprague's pipits are relatively limited, but widespread across the Project and its vicinity. A review of eBird (2014) data (up to and including November 2013) revealed that Sprague's pipits were recorded in Project counties, and/or counties adjacent to Project counties, in Texas, Oklahoma, Arkansas, and Tennessee (see Figure 5.29-1, "Potential Presence of Sprague's Pipit in the Action Area"). In Lipscomb County, Texas, a single observation of two individuals was recorded in April 2006. In Oklahoma, 29 observations totaling at least 305 individuals were recorded across Cimarron, Beaver, Alfafa, Canadian, Noble, Payne, and Tulsa Counties. These birds were recorded from October to December and from March to April between the years of 1991 and 2013. The USFWS also has identified these counties, as well as Sequoyah County, as areas of known occurrence in Oklahoma (USFWS 2014). In Arkansas, 48 observations totaling at least 71 individuals were recorded across Crawford, White, and Prairie Counties between the months of November and April from 2010 to 2013 (eBird 2014). The USFWS has also identified Franklin County as an area of known occurrence in Arkansas (USFWS 2014). In Shelby County, Tennessee, 61 observations of 154 total individuals have been recorded between October and April; however, it is worth noting that all of these observations were recorded by the Memphis Chapter of the Tennessee Ornithological Society between 1953 and 1960 (eBird 2014). There is no indication as to whether surveys were discontinued, data for subsequent surveys had not yet been submitted to eBird, or if the species simply stopped appearing at these locations.

Desktop Analyses

Clean Line reviewed the USGS's National Land Cover Dataset to identify potential Sprague's pipit migration and winter habitat for the Project (Jin et al. 2013). Grasslands and pastures were both considered, as Sprague's pipits are known to use both habitat types during migration (USFWS 2010). Clean Line identified all grasslands and pastures within 200 feet of all Project features (Proposed Route, AC Collection Lines, and converter stations) located within the Sprague's pipit migration corridor as identified by Jones (2010), which includes only Project features in Oklahoma and Texas. Tables 5.29-1, "Grasslands and Pastures Potentially Impacted by Project Features – Proposed Route," 5.29-2, "Grasslands and Pastures Potentially Impacted by Project Features – HVAC Routes," and 5.29-3, "Grasslands and Pastures Potentially Impacted by Project Features – Converter Station," present the acreage of grasslands and pastures potentially impacted by the Project within the 200-foot buffer. The Project route habitat acreages are also separated by county. There are several areas where Project features and their 200-foot buffers overlap (e.g., at the western terminus of the Project route); however, each Project feature was analyzed separately. As such, overcounting of potential impact acreages does occur when evaluating Project features cumulatively.

Table 5.29-1
Grasslands and Pastures Potentially Impacted by Project Features – Proposed Route

County	Grassland (acres)	Pasture (acres)	ROW Acreage Total
Beaver	685.3	0	685.3
Creek	158.0	84.3	242.3
Garfield	144.3	0	144.3
Harper	611.3	0	611.3
Kingfisher	10.3	0	10.3
Lincoln	125.6	8.9	134.5
Logan	274.8	0	274.8
Major	519.8	0	519.8
Muskogee	188.6	491.4	680.0
Okmulgee	166.3	325.0	491.3
Payne	389.6	43.5	433.2
Sequoyah	50.0	488.9	538.9
Texas	438.2	0	438.2
Woodward	622.5	0	622.5
Grand Total	**4384.5**	**1442.0**	**5826.5**

Note: Includes a 200-foot buffer (Jin et al. 2013). Includes areas that lie within the Sprague's pipit migration corridor, as defined by Jones (2010).

Table 5.29-2
Grasslands and Pastures Potentially Impacted by Project Features – HVAC Routes

HVAC Link	Grassland (acres)	Pasture (acres)
E 1	572.2	0
E 2	570.5	0
E 3	648.8	0
NE 1	303.7	0
NE 2	463.2	0
NW 1	598.1	0
NW 2	654.3	0
SE 1	514.8	0
SE 2	170.8	0
SE 3	569.7	0
SW 1	313.0	0
SW 2	741.0	0
W 1	376.3	0
Grand Total	6,496.5	**0**

Note: Includes a 200-foot buffer (Jin et al. 2013). Includes areas that lie within the Sprague's pipit migration corridor, as defined by Jones (2010).

Table 5.29-3
Grasslands and Pastures Potentially Impacted by Project Features – Converter Station

	Grassland (acres)	Pasture (acres)
Texas County Converter Station Siting Area	624.3	0

Note: Includes a 200-foot buffer (Jin et al. 2013). Includes areas that lie within the Sprague's pipit migration corridor, as defined by Jones (2010).

5.29.5 Direct and Indirect Impacts

Direct Mortality/Injury

Project activities could directly cause mortality or injury to Sprague's pipit via collisions with Project vehicles and transmission lines. Collisions with vehicles traveling along access roads or Project ROWs would be reduced by EPMs GE-6, GE-20, and GE-22 (see Section 5.29.6.1, "Environmental Protection Measures"). Collisions with transmission lines could occur during operation of the Project; however, there are measures known to reduce collisions. Clean Line will develop and implement an Avian Protection Plan (APP) consistent with APLIC guidelines that describes a program of specific and comprehensive actions that, when implemented, will reduce risk of avian mortality. Collision risk is largely determined by bird behavior, but morphology, environmental conditions, and engineering are factors as well (APLIC 2012). For example, birds may be at higher risk of collision if they are flushing or if they fly during poorer visibility conditions, such as inclement weather and darkness. Sprague's pipits are diurnal migrants, which suggests darkness would not contribute to poorer vision and increase the risk of collisions (Robbins and Dale 1999). Furthermore, the species largely walks or runs while foraging or evading predators and does not perform aerial displays outside of the breeding season. For these reasons, Sprague's pipits are highly unlikely to collide with Project components.

Sprague's pipit mortalities and/or injuries could also directly result from several other Project activities. Herbicide use for weed control, as well as fuel and other chemical spills, could cause mortality or illness in individuals that come in direct contact with the spill. Mortality or illness could occur indirectly if fuel or other chemical spills affect the Sprague pipits' food sources. However, Clean Line would keep emergency and spill response equipment available during Project activities so that spills would be promptly contained, thus reducing potential adverse effects on the species (see GE-13 in Section 5.29.6.1 "Environmental Protection Measures").

Sensory Disturbance

Direct impacts from sensory disturbance also are possible, as noise, vibrations, and human presence could cause displacement or avoidance of construction areas by migrating or wintering Sprague's pipits. However, little is known regarding the effects of sensory disturbances on Sprague's pipits during migration and winter. Sensory disturbance impacts are expected to be short-term, lasting only as long as construction crews and equipment are present in a specific area. Sprague's pipits may be present in grasslands and pastures throughout the Project area between late September and early May (Grzybowski et al. 2009; eBird 2014).

Habitat Loss/Alteration

Clearing of grassland or pasture habitats during the construction phase of the Project could have potential indirect, negative impacts on Sprague's pipits. Tables 5.29-1 through 5.29-3 provide an estimate of the total acreage of grasslands and pastures that may be impacted by the Project in the Sprague's Pipits migration range, according to Jones (2010). Nearly 6,000 acres of grassland/pasture occur within 200 feet of the proposed HVDC centerline, and almost 6,500 acres of grassland occur within 200 feet of proposed HVAC centerlines. Counties traversed by the HVDC ROW vary greatly in the potential numbers of acres impacted, ranging from only 10.3 acres of grassland in Kingfisher County to 685.3 acres in Beaver County. In most workspaces, vegetation clearing would be limited to the removal or mowing of trees and shrubs. Grassland or pasture habitat would only be cleared where permanent structures (e.g., towers, compressor stations) constructed or where access roads are constructed or improved. Habitat loss and alteration impacts are expected to be short-term, as it would take less than five years to restore native grasslands or pastures to their pre-construction conditions. Impacts would be permanent where permanent Project structures are erected in grassland and pasture habitats.

Increased Predation

Transmission structures/poles may improve hunting efficiency for avian predators (i.e., raptors) in open habitats, like those inhabited by Sprague's pipits, by increasing visibility of the surrounding area when natural perches do not naturally occur (Lammers and Collopy 2007). Predation of Sprague's pipits, particularly during migration and winter, is poorly understood. It stands to reason that Sprague's pipits would be less susceptible to avian predators than other migratory birds because of the secretive behavior and cryptic coloration (USFWS 2010). Furthermore, this species forages by walking or running among preferably densely vegetated grasslands (Robbins and Dale 1999; USFWS 2010). For these reasons, Project impacts associated with increased predation of Sprague's pipits are expected to be negligible to minimal. Any potential impacts associated with birds (i.e., predators) perching on Project structures would be considered long-term (or permanent relative to the life of the Project) impacts on Sprague's pipits.

5.29.6 Protection Measures

Clean Line has agreed to a number of measures to avoid or minimize impacts on Sprague's pipits. These measures include the Clean Line-designated EPMs outlined in Section 2.5, "Environmental Protection Measures," and species-specific measures. Collectively, the EPMs and species-specific measures are referred to as "protection measures."

5.29.6.1 Environmental Protection Measures

The following EPMs—general (GE) and fish, vegetation, and wildlife (FVW)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on Sprague's pipits:

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety, and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits
- (GE-2) – Clean Line will design, construct, maintain, and operate the Project following current APLIC guidelines to minimize risk of avian mortality.
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.
- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-20) – Clean Line will conduct construction and scheduled maintenance activities on the facilities during daylight hours, except in rare circumstances that may include, for example, to address emergency or unsafe situations, to avoid adverse environmental effects, to minimize traffic disruptions, or to comply with regulatory or permit requirements.
- (GE-22) – Clean Line will impose speed limits during construction for access roads (e.g., to reduce dust emissions, for safety reasons, and for protection of wildlife).

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-2) – Clean Line will identify and implement measures to control and minimize the spread of non-native invasive species and noxious weeds.

- (FVW-3) – Clean Line will clearly demarcate boundaries of environmentally sensitive areas during construction to increase visibility to construction crews.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.

5.29.6.2 Species-specific Measures

The primary threat to continuing existence of the Sprague's pipit is loss and modification of grassland habitats, particularly native grasslands (Robbins and Dale 1999; Jones 2010; USFWS 2010). Clean Line has developed EPMs to address the preservation of native grasslands (prairies) during the construction and operation of the Project, most notably FVW-1 (see Section 5.29.6.1 "Environmental Protection Measures"). As such, Clean Line proposes to rely on their EPMs to minimize potential Project impacts on Sprague's pipit.

5.29.7 Effects Determination

The migration and winter ecology of Sprague's pipits are poorly understood; however, it can be assumed that the species may occur in grasslands and pastures throughout the Project from late September to early May (Grzybowski et al. 2009; USFWS 2010; eBird 2014). Sprague's pipit behavior will contribute to reducing Project-related impacts on the species. For example, diurnal migratory flights and their propensity to walk/run while foraging indicate that the species is highly unlikely to collide with Project components. In addition, their cryptic plumage, secretive behavior, and preference for dense grasslands may minimize the likelihood that the species falls prey to avian predators that use transmission structures as perches. The Project's implementation of EPMs also will help reduce or avoid impacts on Sprague's pipit. Environmental Protection Measure FVW-1, for example, will aid in minimizing impacts on preferred native grasslands.

Taking into consideration the proposed Project design as well as the implementation of the aforementioned EPMs and species-specific measures proposed by Clean Line, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project "may affect, but is not likely to adversely affect" Sprague's pipit.

Sprague's pipit does not currently have designated critical habitat; therefore, the Project "will not destroy or adversely modify" critical habitat.

5.30 Whooping Crane

The whooping crane (*Grus americana*) was initially listed as endangered under the Endangered Species Preservation Act of 1966, which was superseded by the Endangered Species Act of 1973 (USFWS 1967; USFWS 2013a). The USFWS designated critical habitat for whooping cranes in nine locations on May 15, 1978 (USFWS 1978). The designated critical habitat is composed of seven National Wildlife Refuges (NWRs) across Colorado, Idaho, Kansas, New Mexico, Oklahoma, and Texas, as well as Cheyenne Bottoms State Waterfowl Management Area in Kansas and the Platte River Bottoms in Nebraska. The Salt Plains NWR, in Oklahoma, is the designated critical habitat nearest to the Project and lies approximately 30 miles north of the HVDC ROW.

5.30.1 Natural History

Whooping cranes migrate through the Project; however, they do not breed or winter near the Project. As such, discussion of their breeding and winter range, habitats, and behaviors is limited.

Range

The only natural, self-sustaining wild population of whooping cranes is commonly referred to as the Aransas-Wood Buffalo population (Lewis 1995; CWS and USFWS 2007; USFWS 2012; USFWS 2014a). There are several experimental populations; however, these populations are not protected under the ESA and are not discussed in this report. Whooping cranes breed primarily within the boundaries of Wood Buffalo National Park in the Northwest Territories and Alberta, Canada. They winter in Aransas NWR along the Texas Gulf Coast. The species migrates through the Great Plains and Canadian Prairie Provinces to and from their wintering and breeding grounds.

Migration Ecology

Whooping cranes typically depart their wintering grounds at Aransas NWR between March 25 and April 15, with the last birds heading north by May 1 (Lewis 1995; CWS and USFWS 2007; USFWS 2014a). Family groups and pairs are among the first to depart, followed by other small flocks and individuals (Lewis 1995; CWS and USFWS 2007). They travel about 2,400 miles through the Great Plains and Canadian Prairie Provinces to their breeding grounds in Wood Buffalo National Park and its vicinity, following an approximately 220-mile-wide corridor, within which 95% of all migrating whooping crane sightings have been documented (see Figure 5.30-1, "Whooping Crane Migration") (Lewis 1995; USFWS 2009, 2014a). Spring migration typically takes two to four weeks, although more experienced birds may complete the trip in as few as 10 or 11 days (Lewis 1995; CWS and USFWS 2007).

Whooping cranes are diurnal migrants that stop daily during spring migration to forage and rest (Lewis 1995; CWS and USFWS 2007; USFWS 2014a). They roost during the evenings in shallow water in wetlands, lakes, ponds, and riverine areas away from human activity (Lewis 1995). Whooping cranes often select stopover habitat based on the presence of sandhill cranes (*Grus canadensis*) (Stehn 2007). Whooping cranes leave their roost after daybreak to forage in a variety of cropfields and emergent wetlands, and generally wait until the air warms and provides thermal updrafts before continuing their migration (Lewis 1995; USFWS 2014a). Migrating birds typically fly at elevations below 1,970 feet, although elevations of 5,000 feet also are common (Lewis 1995). When groups of cranes fly together, V-formations are most common, but echelon formations are used for low-altitude flapping flights and high-altitude flights assisted by tailwinds. Their daily flight ends in the mid-afternoon or later, at which point they forage before roosting at dusk.

The fall migration of whooping cranes typically begins with yearlings and subadults departing the breeding grounds beginning in mid-September (Lewis 1995; CWS and USFWS 2007; USFWS 2014a). Family groups and paired adults begin their migration in early October, and most birds arrive at Aransas

NWR for the winter from late October to mid-November. Late migrants sometimes arrive as late as early January (Lewis 1995). During fall migration, whooping cranes generally follow the same corridor and exhibit the same behaviors (i.e., flight, habitat and dietary preferences) as they do in spring; however, unlike during the spring, fall migration includes staging grounds in Saskatchewan (Lewis 1995; CWS and USFWS 2007; USFWS 2014a). Upon leaving their breeding grounds, whooping cranes complete a one- to two-day trip to an agricultural area in Saskatchewan, where they spend one to four weeks foraging on waste grain in barley and wheat stubble fields, and roosting in wetlands. The remainder of the trip to Aransas NWR occurs comparatively rapidly, and may be completed in about one week.

5.30.2 Population Status

Historically, about 10,000 whooping cranes inhabited North America (CWS and USFWS 2007; USFWS 2012). The population had dwindled to approximately 1,400 birds by the mid-1800s, and reached a low of 15 individuals by 1941. These last remaining birds bred in Wood Buffalo National Park and wintered in Aransas NWR. They remain the only natural, self-sustaining wild population today. The near-extinction of whooping cranes is largely attributed to hunting and loss of habitats to agriculture. Conservation efforts and increased regulatory protection have allowed the Aransas-Wood Buffalo population to slowly increase to more than 300 birds (CWS and USFWS 2007; USFWS 2012, 2014b). The USFWS conducted winter surveys in Aransas NWR in the 2013/2014 winter and estimated the population at 304 birds (USFWS 2014b).

In addition, there are three experimental reintroduction populations (CWS and USFWS 2007; USFWS 2012). Two are non-migratory populations (Florida and Louisiana) and one migratory population is bred at Patuxent Wildlife Research Center in Maryland, transported to a breeding area in Wisconsin (USFWS 2012). The migratory population is trained to migrate following ultralight aircraft to the central Gulf Coast of Florida in the fall. The experimental populations are not protected under the ESA.

5.30.3 Current Threats

Habitat modification and destruction was a major contributing factor in the historic decline of whooping cranes and continues to be a threat to the species (Lewis 1995; CWS and USFWS 2007; USFWS 2012 2014a). Historically, whooping cranes bred across much of the Northern Great Plains of the United States and Canada, but human settlement and the subsequent conversion of lands for agricultural uses made most of their nesting habitat unsuitable (Lewis 1995; CWS and USFWS 2007; USFWS 2012). Similarly, diversion of water in major river systems and the draining of wetlands in the prairie pothole region have degraded a substantial amount of potential migration habitat. The loss of wetland habitat continues, as agricultural production grows with the production of ethanol (USFWS 2012). As human populations continue to expand, decreases in freshwater inflows are becoming problematic at the Aransas NWR wintering grounds (CWS and USFWS 2007). Freshwater inflows from major rivers, primarily the Guadalupe and the San Antonio, have been reduced by human water consumption and threaten the ecological health of estuaries associated with the refuge. Population growth on the Texas coast also threatens salt marsh habitats and the potential expansion of the whooping crane winter range (USFWS 2012). Finally, the construction of roads, buildings, power lines, towers, wind turbines, and other development contribute to the habitat modification and removal, and pose mortality risks from collisions.

Hunting was a substantial contributor to the decline of the whooping cranes historically, particularly between the 1870s and 1920s (Lewis 1995; CWS and USFWS 2007; USFWS 2012). The adoption of the Migratory Bird Treaty Act in 1918 made killing whooping cranes and collecting their eggs illegal, and largely reduced incidents of whooping cranes being shot. Whooping crane mortalities associated with hunting are rare in recent decades, but instances of poaching do occur. The hunting of sandhill cranes and waterfowl also may pose threats to whooping cranes, especially during migration, as they occur in similar habitats. Shootings have also occurred on wintering grounds by sandhill crane hunters who lacked sufficient bird identification skills (USFWS 2012).

Whooping cranes are particularly sensitive to human disturbance on their breeding grounds, and will avoid areas of human activity (Lewis 1995; CWS and USFWS 2007; USFWS 2012). The public does not have access to the majority of whooping crane nesting habitat; however, researchers and biologists do conduct egg transfers and banding at Wood Buffalo National Park (CWS and USFWS 2007; USFWS 2012). These efforts have indicated that whooping cranes may be more tolerant of brief disturbances (USFWS 2012). The public has substantial access to whooping crane winter habitat in Aransas NWR (Lewis 1995; CWS and USFWS 2007; USFWS 2012). More than 70,000 people visit the refuge annually, many hoping to see the cranes (CWS and USFWS 2007). The refuge and surrounding waters are also used by waterfowl hunters, birders, anglers, and recreational and commercial boats (Lewis 1995; CWS and USFWS 2007; USFWS 2012). Research conducted at Aransas NWR revealed that whooping cranes responded negatively to approximately 40% of all disturbances, causing displacement from habitats (moving an average of 1,725 feet) and social disruption of flocks (CWS and USFWS 2007; USFWS 2012). Research regarding disturbance effects at migratory stopover habitats is limited, but whooping cranes do appear to roost away from human activity during migration (Lewis 1995).

Collisions with power lines are considered a substantial cause of whooping crane mortality during migration (CWS and USFWS 2007; USFWS 2012). At least 45 whooping cranes (including birds from the Aransas-Wood Buffalo and three reintroduced experimental populations) have been killed or seriously injured by collisions with power lines (transmission and distribution) since 1956 (USFWS 2012). Of the 45 known whooping crane mortalities, only nine are associated with the Aransas-Wood Buffalo population (Stehn and Wassenich 2008). A 1980s study of nine juvenile whooping cranes from the Aransas-Wood Buffalo population observed two of the individuals dying from collisions with power lines within the first 18 months of life (Lewis 1995; CWS and USFWS 2007; APLIC 2012; USFWS 2012). Collisions with other structures also have been documented, including wire fences, aircraft, and vehicles (CWS and USFWS 2007; USFWS 2012). The continuing development of wind energy and communication towers may also present collision risks. There are no known mortalities associated with wind turbines or communication towers (i.e., associated guy wires); however, research into the impacts of these structures is lacking.

Climate change also may pose a threat to whooping cranes. Drought and adverse weather may also pose threats to whooping cranes during migration (CWS and USFWS 2007; USFWS 2012). Drought can limit the available habitat for roosting and foraging at stopovers. Adverse weather conditions can impede the progress of their migration, degrade their navigational capabilities, and make their travels more dangerous. Whooping crane wintering grounds at Aransas NWR are particularly susceptible to sea level rise, and the flooding of coastal wetlands is a potentially major threat to the species (USFWS 2012). Conversely, drought may limit the availability of habitat and food at Aransas, and late-season hurricanes could result in whooping crane mortality (CWS and USFWS 2007; USFWS 2012). Drought, adverse weather, the timing and intensity of hurricane season, and sea level rise are all anticipated effects from global warming.

Contaminant spills are a substantial potential threat to whooping cranes and their wintering habitat at Aransas NWR (Lewis 1995; CWS and USFWS 2007; USFWS 2012). Aransas NWR lies along the Gulf Intracoastal Waterway where barges carry potentially toxic chemicals daily. Similarly, numerous oil and gas wells and connecting pipelines occur in the bay and uplands near their wintering grounds (CWS and USFWS 2007; USFWS 2012). A large spill in this area could kill cranes and/or severely degrade their habitats. Wintering cranes are also exposed to contaminants associated with agricultural and industrial run-off. There is no evidence that whooping cranes are susceptible to pesticide contamination (Lewis 1995; CWS and USFWS 2007; USFWS 2012).

Disease and parasites may pose threats to the mortality of whooping cranes; however, little is known about their importance (CWS and USFWS 2007; USFWS 2012). Evidence of disease-related mortality has been infrequently documented, but diseases including tuberculosis, infectious bursal disease, and herpes viruses have been documented in whooping cranes. Still, other diseases, toxins, and parasites pose potential threats to the species. The loss of wetland habitats has resulted in waterbirds becoming more concentrated in aquatic habitats, which increases the likelihood of disease exposure and transmission.

Adult whooping cranes are generally not susceptible to predation unless weakened by injury or disease, or flightless during feather molt (occurs in adults once every three years); however, eggs and chicks are depredated by a number of mammalian and avian predators (CWS and USFWS 2007; USFWS 2012). The impact of predation of eggs and chicks on recruitment is poorly understood, but it may be a factor in the 10-year population cycle. Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) may be a threat to adult whooping cranes during migration, as these species have been documented taking cranes (both whooping and sandhill cranes) during these periods (Lewis 1995; CWS and USFWS 2007; USFWS 2012).

5.30.4 Potential Presence in the Action Area

Definition of the Action Area

Whooping cranes may occur in suitable migration habitat (i.e., crop fields and shallow water in aquatic habitats) anywhere within their approximately 220-mile-wide migration corridor (see Figure 5.30-2, “Potential Presence of Whooping Crane in the Action Area”). Observations outside of this corridor also are possible, but are much more unlikely as the migration corridor includes 95% of all known observations of the species (Lewis 1995; USFWS 2014a). Armbruster (1990) indicated that whooping cranes would not likely travel farther than about 1 mile between roosting and foraging sites during migration. Whooping cranes are susceptible to human disturbance during migration, and generally select roosting and foraging sites away from human activity (Lewis 1995). Considering all of these factors, the Action Area for the whooping crane is considered to be all suitable habitat (see “Additional Desktop/Field Analyses,” below) within 1 mile of the project disturbance footprint where it traverses the 220-mile migration corridor during spring (March 25 to May 15) and fall (October 15 to December 15).

Presence in the Action Area Based on Existing Data

The Whooping Crane Migration Corridor accounts for 95% of all historic whooping crane observations within a 220-mile-wide path that will be entirely traversed by the Project (see Figure 5.30-2, “Potential Presence of Whooping Crane in the Action Area”). In fact, 75% of all confirmed observations have been recorded within an 80-mile-wide corridor. The Project traverses portions of Woodward, Major, Garfield, and Kingfisher Counties in this 80-mile-corridor. Given this information, the entire Aransas-Wood Buffalo population will migrate through the Project area two times annually (spring and fall). A review of confirmed whooping crane sighting data (through 2010) revealed that no sightings have been recorded in the Action Area (USFWS 2010).

Salt Plains NWR also lies in the heart of this corridor, and is designated critical habitat approximately 30 miles north of the Project. There are 25 eBird (2014) observations of whooping cranes in the vicinity of Salt Plains NWR (up to and including November 2013), totaling at least 212 birds between 2002 and 2012. All but one of the observations (three total birds) occurred during fall migration between October 27 and December 11. The spring observation was recorded on April 7. According to the

USFWS (2014a, c), whooping cranes have been observed in all Oklahoma Project counties except Cimarron, Creek, and Sequoyah.

Additional Desktop/Field Analyses

Clean Line used a modified version of The Watershed Institute, Inc.'s (2013) habitat assessment model to identify and rank potentially suitable whooping crane stopover habitat within the Action Area (i.e., within 1 mile of the 200-foot Project ROW where it traverses the 220-mile migration corridor). A total of 72 suitable wetlands in the Action Area were compared to suitable wetlands in Salt Plains NWR, which served as a reference site. All suitable wetlands in the Action Area and at the reference site were ranked according to 6 suitability criteria. Suitable wetlands at Salt Plains NWR received suitability scores ranging between 14 and 27 with an average score of 19.9. Suitable wetlands in the Action Area received suitability scores ranging from 5 to 18 with an average score of 10.5. The average score at Salt Plains NWR was considered the threshold in distinguishing between low and high quality stopover habitats for whooping cranes; therefore, a score of 20 or higher was considered high quality, suitable habitat and a score below 20 was considered low quality suitable habitat.

Clean Line added an additional step to the assessment wherein confirmed whooping crane sighting data were compared with suitability scores of potentially suitable wetlands at Salt Plains NWR. Confirmed whooping crane sightings at Salt Plains NWR occurred in potentially suitable wetlands with habitat suitability scores ranging from 20 to 26 with an average score of 24.1. All of the confirmed whooping crane sightings occurred in wetlands with a suitability score equal to or higher than the threshold of 20, above which stopover habitats were determined to be high quality by the model. These results provide further credence to the concept that wetlands scoring less than 20 in the Project's assessment area are lower quality whooping crane stopover habitats. Thus, the 72 suitable wetlands analyzed in the Action Area were considered low quality. Refer to the "Whooping Crane Habitat Suitability Assessment Model" in Appendix G for complete details regarding the purpose, methods, and results of this desktop analysis.

5.30.5 Direct and Indirect Impacts

Direct Mortality/Injury

Project activities could directly cause mortality or injury to whooping cranes via collisions with construction vehicles, transmission lines, and other Project structures (CWS and USFWS 2007; USFWS 2012). Generally, whooping cranes would be able to avoid Project vehicles, as they often avoid roads. However, there are documented records of reintroduced whooping cranes being struck by vehicles as they forage near roads (USFWS 2012). Possible impacts associated with vehicle collisions would be short term, potentially occurring only when Project construction or maintenance activities take place during spring or fall migration. The Project would implement EPM GE-6, GE-20, and GE-22 (see Section 5.30.6.1, "Environmental Protection Measures") to prevent mortalities and/or injuries related to vehicle traffic.

Collisions with transmission lines and other Project structures could occur during the operation phase. Whooping Cranes number approximately 300 individuals, and given their small population, they are particularly susceptible to even a small loss of individuals. Collisions with power lines are a known cause of mortality of whooping cranes and could occur during operation of the Project. Impacts associated with power line collisions would be considered permanent, as they would potentially occur over the life of the Project. However, there are no high quality stopover habitats in the Action Area, according to habitat suitability assessment model results (Appendix G). Thus, whooping cranes would be unlikely to stopover in the Action Area compared to areas with higher quality stopover habitats (e.g., Salt Plains NWR). In addition, no confirmed sightings of whooping cranes have been documented in the Action Area. Furthermore, there are measures known to reduce collisions (Lewis 1995; CWS and USFWS

2007; APLIC 2012; USFWS 2012). Clean Line will develop and implement an Avian Protection Plan, consistent with APLIC guidelines that describes a program of specific and comprehensive actions that when implemented, will reduce risk of avian mortality (including whooping cranes). All of the these factors combined indicate that potential whooping crane collisions with Project components would be highly unlikely to occur.

Collision risk is largely determined by bird behavior, but morphology, environmental conditions, and engineering are factors, as well. Whooping cranes make regular, repeated flights between foraging and roosting areas during migration. When this occurs in proximity to power lines, whooping cranes are at increased risk of collisions. Birds may also be at higher risk if they are distracted when flushing. Inclement weather and darkness may contribute to poorer vision and increase collision exposure. In addition, design and placement of structures and lines are key factors in collision risk (APLIC 2012). The APLIC (2012) notes studies that have shown that using bird flight diverters can significantly decrease power line collisions compared to unmarked lines, and may reduce the numbers of power line flyovers as birds opt to fly parallel to lines rather than over them.

Whooping crane mortalities and/or illness could also directly result from fuel and other chemical spills, if they come in direct contact with the spill. Similarly, spills could cause mortality or illness indirectly if water or food sources are contaminated. However, Clean Line would keep emergency and spill response equipment available during construction so that spills would be promptly contained, thus reducing potential for impacts on whooping cranes and other wildlife (see GE-13 in Section 5.30.6.1, “Environmental Protection Measures”).

The Project presents some potentially positive impacts on the species as well. The Project is proposed to transmit wind energy to consumers in the eastern United States. The development of wind energy, along with other forms of renewable energy, is aimed at reducing the carbon footprint of American energy consumption. This, in turn, would aid in reducing the rate and/or effects of climate change. Whooping cranes, like many other species, may suffer substantial negative impacts associated with climate change (CWS and USFWS 2007; USFWS 2012). Thus, the Project would have incremental positive impacts on whooping cranes in relation to climate change.

Sensory Disturbance

Direct impacts from sensory disturbances also are possible, as noise, vibrations, and human presence could cause displacement or avoidance of Project areas by migrating whooping cranes. Disturbances to migrating whooping cranes may disrupt social flocks, cause stress, and limit their ability to forage, decreasing their overall fitness. Sensory disturbance impacts are expected to be short term, lasting only as long as construction crews and equipment are present in a specific area. As previously stated, there are no high quality stopover habitats in the Action Area, according to habitat suitability assessment model results (Appendix G). Thus, whooping cranes would be less likely to stopover in the Action Area compared to areas with higher quality stopover habitats. In addition, no confirmed sightings of whooping cranes have been documented in the Action Area. As such, the Project-related sensory disturbances to whooping cranes during spring or fall migration are possible, but not expected. To further reduce potential impacts, Clean Line will consult with the USFWS and/or other resource agencies for guidance on seasonal and spatial restrictions to be implemented when whooping cranes are in proximity to proposed Project activities (see FVW-5 in Section 5.30.6.1, “Environmental Protection Measures”). In addition, impacts would be avoided because environmental monitors will complete daily surveys to identify migrating whooping cranes in the vicinity of construction activities. If whooping cranes are observed in the Action Area, Clean Line will consult the USFWS and respective state agencies for further instruction and require that all human activity and equipment start-up be delayed or immediately cease (Section 5.30.5.2, “Species-specific Measures”).

Habitat Loss/Alteration

While no confirmed whooping crane sightings have been documented in the Action Area, clearing and other alterations of potential migratory stopover habitats during the construction phase of the Project could have potential indirect, negative impacts on whooping cranes. Loss or degradation of emergent wetland and aquatic roosting habitats would have potentially greater impacts on migrating cranes than would the loss or degradation of crop fields. Whooping cranes forage heavily in crop fields during migration, which are plentiful along the Project (Lewis 1995; USFWS 2014a). As previously stated, there are no high quality stopover roosting habitats in the Action Area, according to habitat suitability assessment model results (Appendix G). Furthermore, the 72 low quality, suitable wetlands identified in the modeling comprise a relatively small portion of the Action Area (0.02 percent). Given this paucity of low quality, suitable whooping crane roosting habitat that is present in the Action Area, Clean Line expects to avoid or minimize ground disturbance in and adjacent to these habitats. In addition, no confirmed sightings of whooping cranes have been documented in the Action Area. Habitat loss and alteration impacts are expected to be short term, as it would take less than five years to restore roosting and foraging habitats to their pre-existing conditions, if not completely avoided. Impacts would be permanent where Project structures are erected in suitable habitats.

Increased Predation

Predation of whooping cranes could increase as a result of the erection of power lines near potential migration habitats. Power lines and structures can provide hunting perches for raptors, particularly in open habitats (e.g., wetlands, agricultural fields), where very few elevated perches exist (Lammers and Collopy 2007). Perching on structures is believed to increase hunting efficiency due to the increased visibility it affords avian predators of the surrounding area. Golden and bald eagles are known predators of whooping cranes, and power lines may increase the likelihood that whooping cranes fall prey to one of these species (Lewis 1995; CWS and USFWS 2007; USFWS 2012). Predation associated with human-made perches could begin with the construction phase of the Project; however, this impact would be expected to be greater during the operations phase, as the full HVDC line and AC lines would be constructed and potentially provide perches for decades (i.e., the life of the Project).

5.30.6 Protection Measures

Clean Line has agreed to a number of measures to avoid or minimize impacts on whooping cranes. These measures include the Clean Line-designated EPMs outlined in Section 2.5, "Environmental Protection Measures," and species-specific measures. Collectively, the EPMs and species-specific measures are referred to as "protection measures."

5.30.6.1 Environmental Protection Measures

The following EPM—general (GE); fish, vegetation, and wildlife (FVW); and waters, wetlands, and floodplains (W)—to be implemented by the Project will contribute to avoiding and/or minimizing impacts on whooping cranes.

General EPMs:

- (GE-1) – Clean Line will train personnel on health, safety and environmental matters. Training will include practices, techniques, and protocols required by federal and state regulations and applicable permits.
- (GE-2) – Clean Line will design, construct, maintain and operate the Project following current APLIC guidelines to minimize risk of avian mortality.
- (GE-3) – Clean Line will minimize clearing vegetation within the ROW, consistent with a TVMP filed with NERC, and applicable federal, state, and local regulations.

- (GE-5) – Any herbicides used during construction and operations and maintenance will be applied according to label instructions and any federal, state, and local regulations.
- (GE-6) – Clean Line will restrict vehicular travel to the ROW and other established areas within the construction, access, or maintenance easement(s).
- (GE-7) – Roads not otherwise needed for maintenance and operations will be restored to preconstruction conditions. Restoration practices may include decompacting, recontouring, and re-seeding. Roads needed for maintenance and operations will be retained.
- (GE-13) – Emergency and spill response equipment will be kept on hand during construction.
- (GE-14) – Clean Line will restrict the refueling and maintenance of vehicles and the storage of fuels and hazardous chemicals within at least 100 feet from wetlands, surface waterbodies and groundwater wells, or as otherwise required by federal, state, or local regulations.
- (GE-20) – Clean Line will conduct construction and scheduled maintenance activities on the facilities during daylight hours, except in rare circumstances that may include, for example, to address emergency or unsafe situations, to avoid adverse environmental effects, to minimize traffic disruptions, or to comply with regulatory or permit requirements.
- (GE-22) – Clean Line will impose speed limits during construction for access roads (e.g., to reduce dust emissions, for safety reasons, and for protection of wildlife).

Fish, Vegetation, and Wildlife EPMs:

- (FVW-1) – Clean Line will identify environmentally sensitive vegetation (e.g., wetlands, protected plant species, riparian areas, large contiguous tracts of native prairie) and avoid and/or minimize impacts to these areas.
- (FVW-5) – If construction occurs during important time periods (e.g., breeding, migration, etc.) or at close distances to environmentally sensitive areas with vegetation, wildlife, or aquatic resources, Clean Line will consult with USFWS and/or other resource agencies for guidance on seasonal and/or spatial restrictions designed to avoid and/or minimize adverse effects.

Water EPMs:

- (W-3) – Clean Line will establish streamside management zones within 50 feet of both sides of intermittent and perennial streams and along margins of bodies of open water where removal of low-lying vegetation is minimized.

5.30.6.2 Species-specific Measures

In addition to the abovementioned EPMs, Clean Line will adhere to the following species-specific measures that have been adapted from relatively recent biological opinion for the Keystone XL pipeline (USFWS 2013b), which is also proposed linear project traversing the whooping crane migration corridor:

- Construction phase: During spring (March 25 to May 15) and fall (October 15 to December 15) whooping crane migration periods, environmental monitors will complete a brief survey of any wetland or riverine habitat areas potentially used by whooping cranes in the morning before starting equipment. If whooping cranes are sighted during the morning survey or at any time of the day, the environmental monitor will immediately contact the USFWS and respective state agencies for further instruction and require that all human activity and equipment start-up be delayed or immediately cease. Work could proceed if whooping crane(s) leave the area. The environmental monitor would record the sighting, bird departure time, and work start time on the survey form. The USFWS would notify the compliance manager of whooping crane migration locations during the spring and fall migrations through information gathered from the whooping crane tracking program.
- If activities must occur outside of daylight hours, Clean Line will prevent lighting from projecting upwards during spring and fall whooping crane migrations in areas that provide suitable stopover habitat.
- Clean Line will install avian markers and deflectors within 0.25 miles of suitable stopover habitat as directed by the USFWS. The USFWS will be contacted should a whooping crane be spotted in the area of the proposed power line construction site.

5.30.7 Effects Determination

The Project traverses the entire Whooping Crane Migration Corridor, which indicates that the entire Aransas-Wood Buffalo population migrates through the Project area twice annually in the spring and fall. The Aransas-Wood Buffalo whooping crane population consists of only about 300 individuals, which means even the loss of one or a few individuals can have substantial impacts on the population. Collisions with power lines are considered a substantial cause of whooping crane mortality during migration (CWS and USFWS 2007; USFWS 2012). Whooping cranes migrate during the day when visibility is improved, but may be vulnerable to collisions because they fly at relatively low altitudes (Lewis 1995). This vulnerability is increased if they fly over power lines while making daily trips from roosts to foraging sites during stopovers. According to habitat suitability modeling results for stopover roosts, there are no high quality, suitable habitats in the Action Area (Appendix G). Furthermore, the 72 low quality, suitable roosting habitats comprise only 0.02 percent of the total Action Area. Finally, no confirmed sightings of whooping cranes have been documented in the Action Area. All of these factors, plus the implementation of the proposed protection measures (see Section 5.30.6, "Protection Measures"), indicate that possible whooping crane collisions with Project components are highly unlikely to occur.

The relatively limited availability of low quality, suitable stopover roosting habitats and the lack of confirmed sightings indicate that whooping cranes do not commonly use the Action Area during spring and fall migration. Accordingly, Project-related impacts associated with direct mortality/injury, sensory disturbance, habitat loss/alteration, and increased predation would be low. Clean Line's commitment to the protection measures detailed in Section 5.30.6, "Protection Measures," will further reduce the already low potential for Project-related impacts on whooping cranes. For these reasons, impacts on whooping cranes are expected to be avoided.

Taking into consideration the proposed Project design as well as the implementation of the aforementioned EPMs and species-specific measures proposed by Clean Line, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project "may affect, but is not likely to adversely affect" whooping cranes.

The Project "will not destroy or adversely modify" critical habitat, as the nearest designated critical habitat for the whooping crane (Salt Plains NWR) is located 30 miles north of the HVDC transmission line.

6.0 Conclusion

The effects determinations for the 30 species evaluated in Section 5, “Species Evaluations,” summarized in Table 6.0-1, “Effects Determinations of Species and Critical Habitats Evaluated in Section 5.” Where applicable, effects determinations for critical habitat also are included. Refer to individual species' evaluations in Section 5, “Species Evaluations,” for complete details regarding potential Project impacts, proposed protection measures, and rationale for the effects determinations. “May Affect, Not Likely to Adversely Affect” and “May Affect, Likely to Adversely Affect” determinations are abbreviated “NLAA” and “LAA”, respectively.

Table 6.0-1
Effects Determinations of Species and Critical Habitats Evaluated in Section 5

Species	Section	Determination
Geocarpon	5.1	No Effect
Pondberry	5.2	NLAA
American Burying Beetle	5.3	LAA
Curtis Pearlymussel	5.4	NLAA
Fanshell	5.5	No Effect
Fat Pocketbook	5.6	NLAA
Neosho Mucket	5.7	No Effect
Pink Mucket	5.8	NLAA
Rabbitsfoot	5.9	NLAA
Proposed Critical Habitat: Rabbitsfoot	5.9	May Affect, Not Like to Destroy/Adversely Modify
Scaleshell Mussel	5.10	NLAA
Snuffbox	5.11	NLAA
Speckled Pocketbook	5.12	NLAA
Spectaclecase	5.13	NLAA
Arkansas Darter	5.14	NLAA
Arkansas River Shiner	5.15	NLAA
Critical Habitat: Arkansas River Shiner	5.15	May Affect, Not Likely to Adversely Modify
Ozark Cavefish	5.16	No Effect
Pallid Sturgeon	5.17	NLAA
Yellowcheek Darter	5.18	No Effect
Ozark Hellbender	5.19	NLAA
Florida Panther	5.20	No Effect
Gray Bat	5.21	LAA
Indiana Bat	5.22	LAA
Northern Long-eared Bat	5.23	LAA
Ozark Big-eared Bat	5.24	LAA

Table 6.0-1
Effects Determinations of Species and Critical Habitats Evaluated in Section 5

Species	Section	Determination
Interior Least Tern	5.25	NLAA
Lesser Prairie-Chicken	5.26	LAA
Piping Plover	5.27	NLAA
Red Knot (rufa subspecies)	5.28	NLAA
Sprague's Pipit	5.29	NLAA
Whooping Crane	5.30	NLAA

7.0 References

7.1 Section 1: Introduction, Section 2: Proposed Action, Section 3: Action Area, and Section 4: Existing Environmental Conditions

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Figure 5.27-1 Potential Presence of Piping Plover in the Action Area
Figure 5.28-1 Potential Presence of Red Knot in the Action Area
Figure 5.29-1 Potential Presence of Sprague's Pipit in the Action Area
Figure 5.30-1 Whooping Crane Migration
Figure 5.30-2 Potential Presence of Whooping Crane in the Action Area

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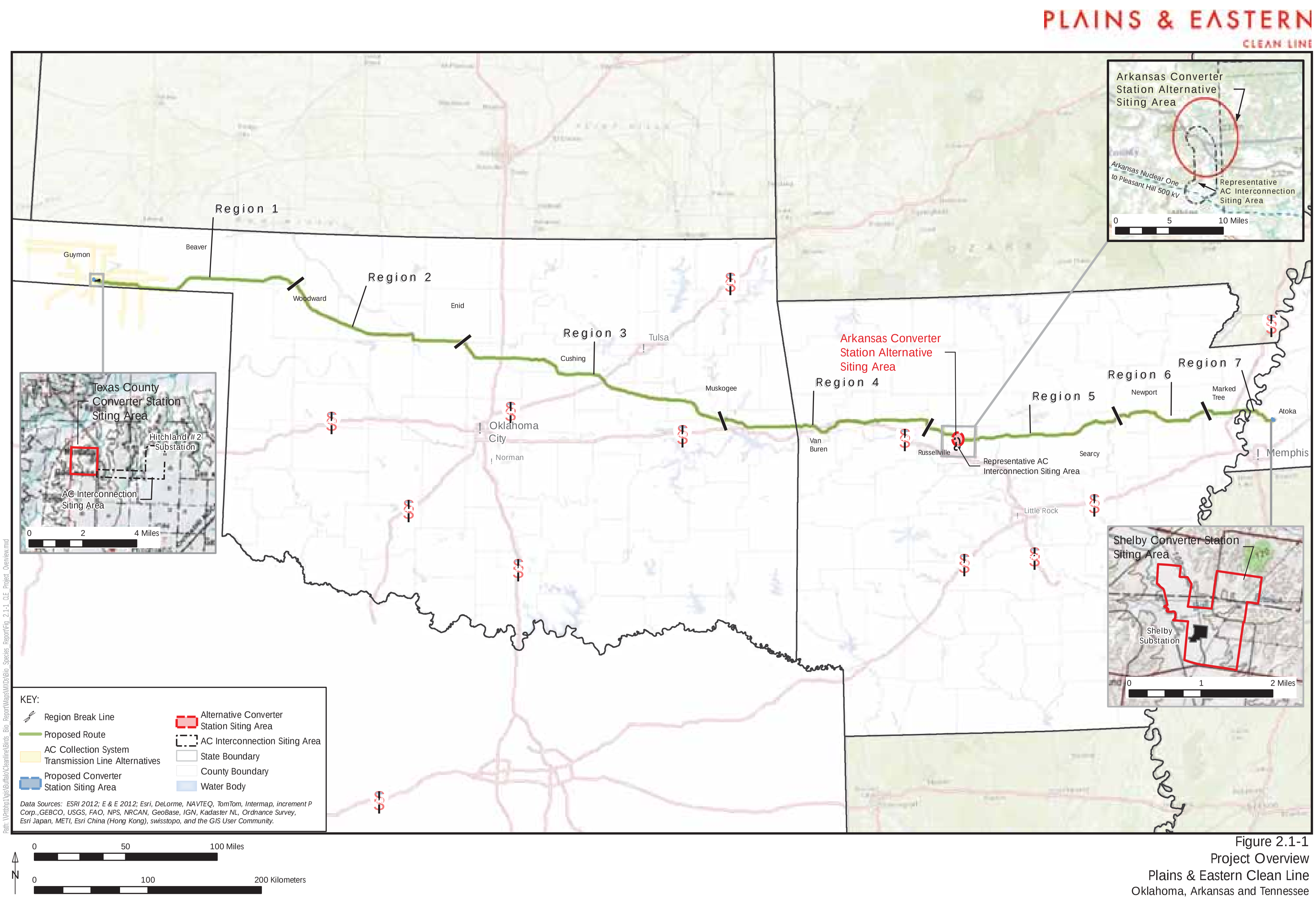

Figure 2.1-1
Project Overview
Plains & Eastern Clean Line
Oklahoma, Arkansas and Tennessee

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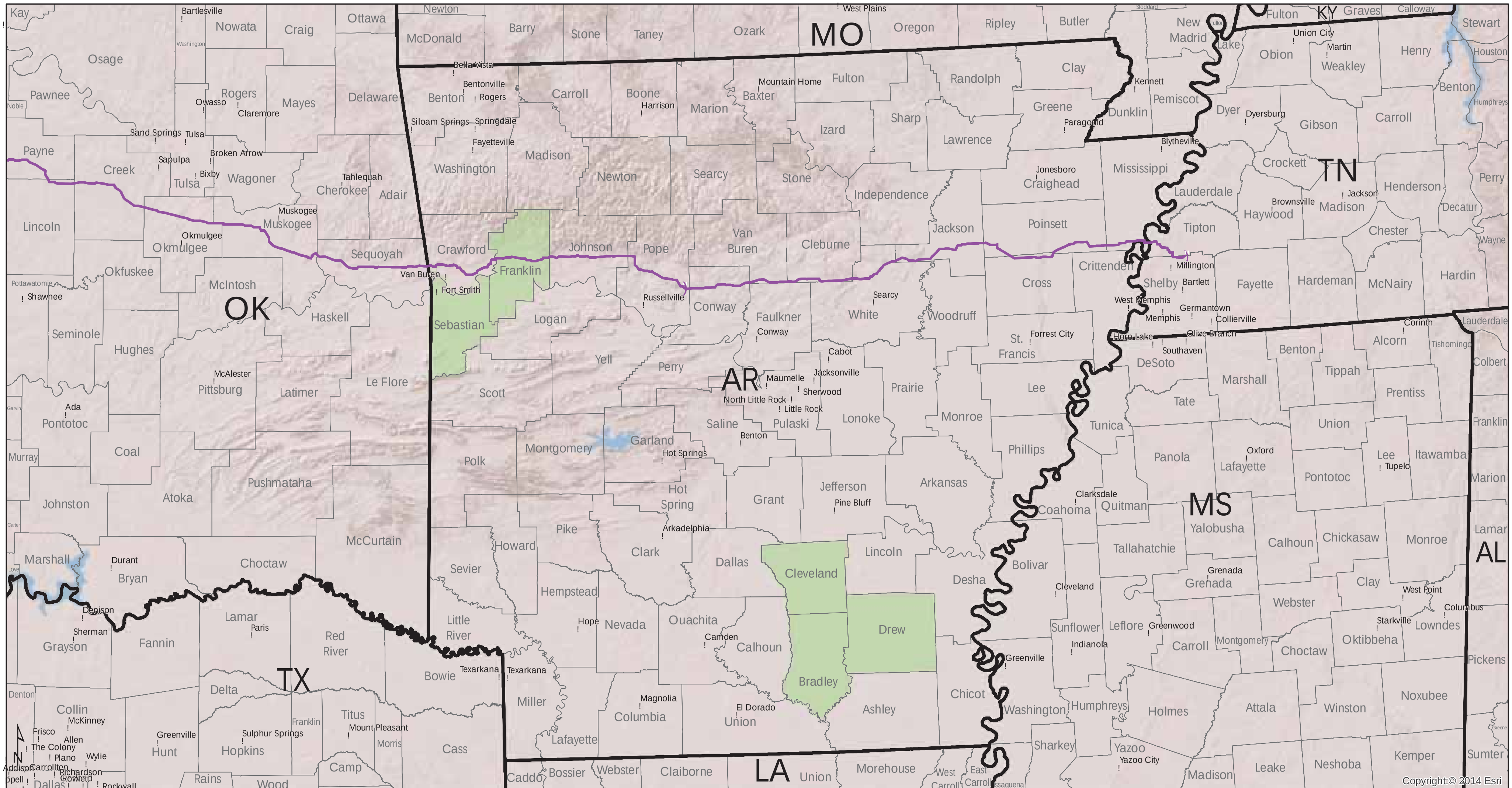


Legend

- Proposed Route
- Converter Station
- Counties with Geocarpon Occurrence (1, 2, 3, 4)

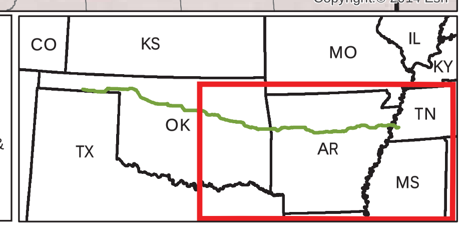
0 50
Miles

Figure 5.1-1

Geocarpon Range
in the Vicinity of the Project

PLAINS & EASTERN
CLEAN LINE

Notes / Sources:
(1) USDA NRCS 2014
(2) USFWS 2014
(3) USFWS 2009 & ANHC 2014
(4) ANHC 2014



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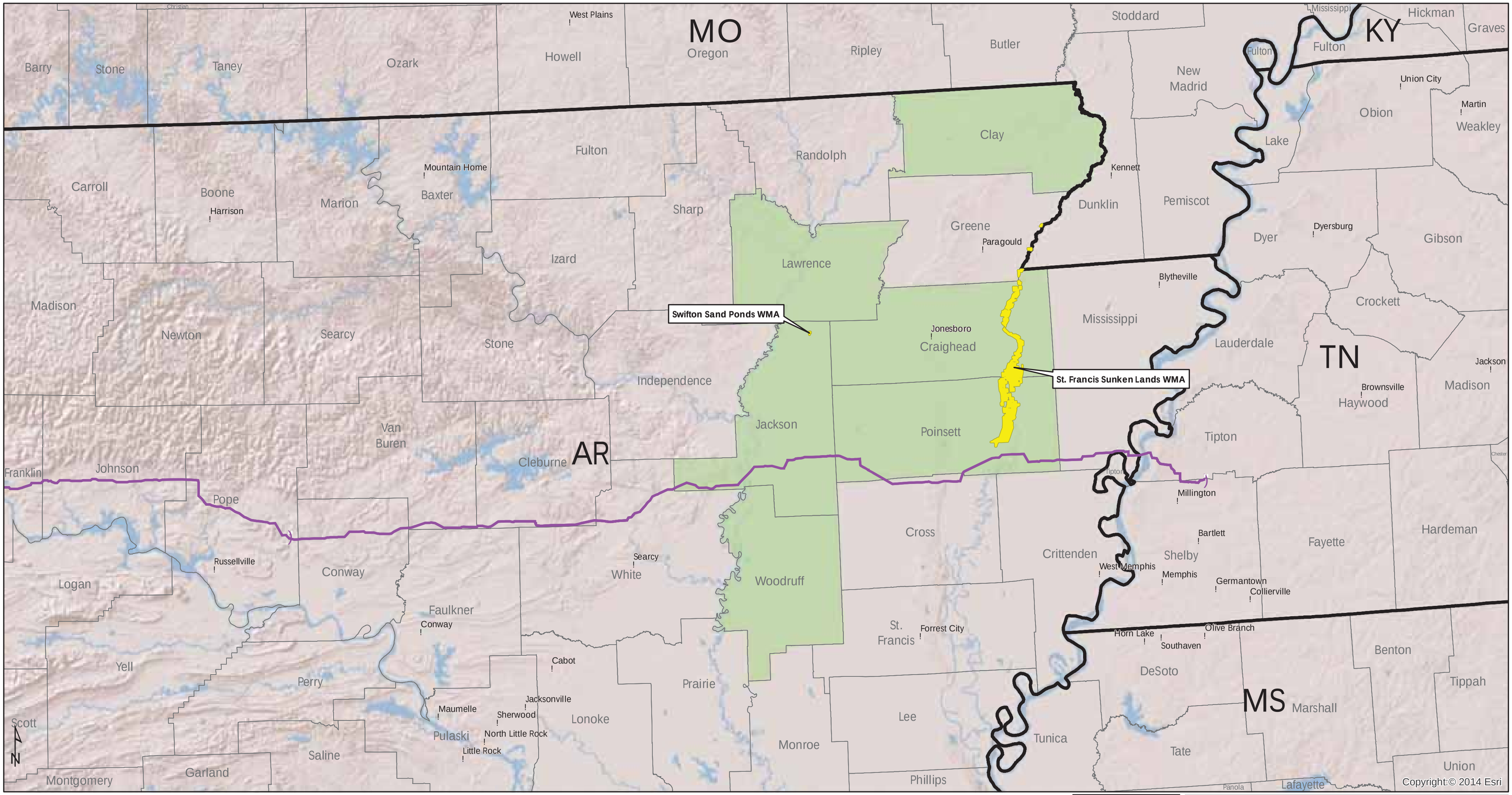


Legend

- Proposed Route
- Converter Station
- Wildlife Management Area
- Counties with Pondberry Occurrence (1, 2, 3)

0 — 50 Miles

Figure 5.2-1

Pondberry Range
in the Vicinity of the Project

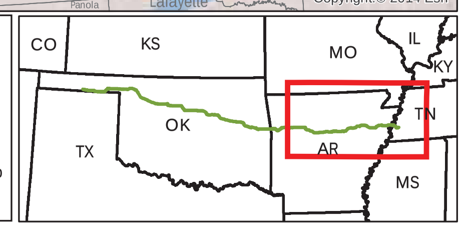
PLAINS & EASTERN CLEAN LINE

Notes / Sources:

(1) USDA NRCS 2014

(2) USFWS 2013

(3) USFWS 2014b



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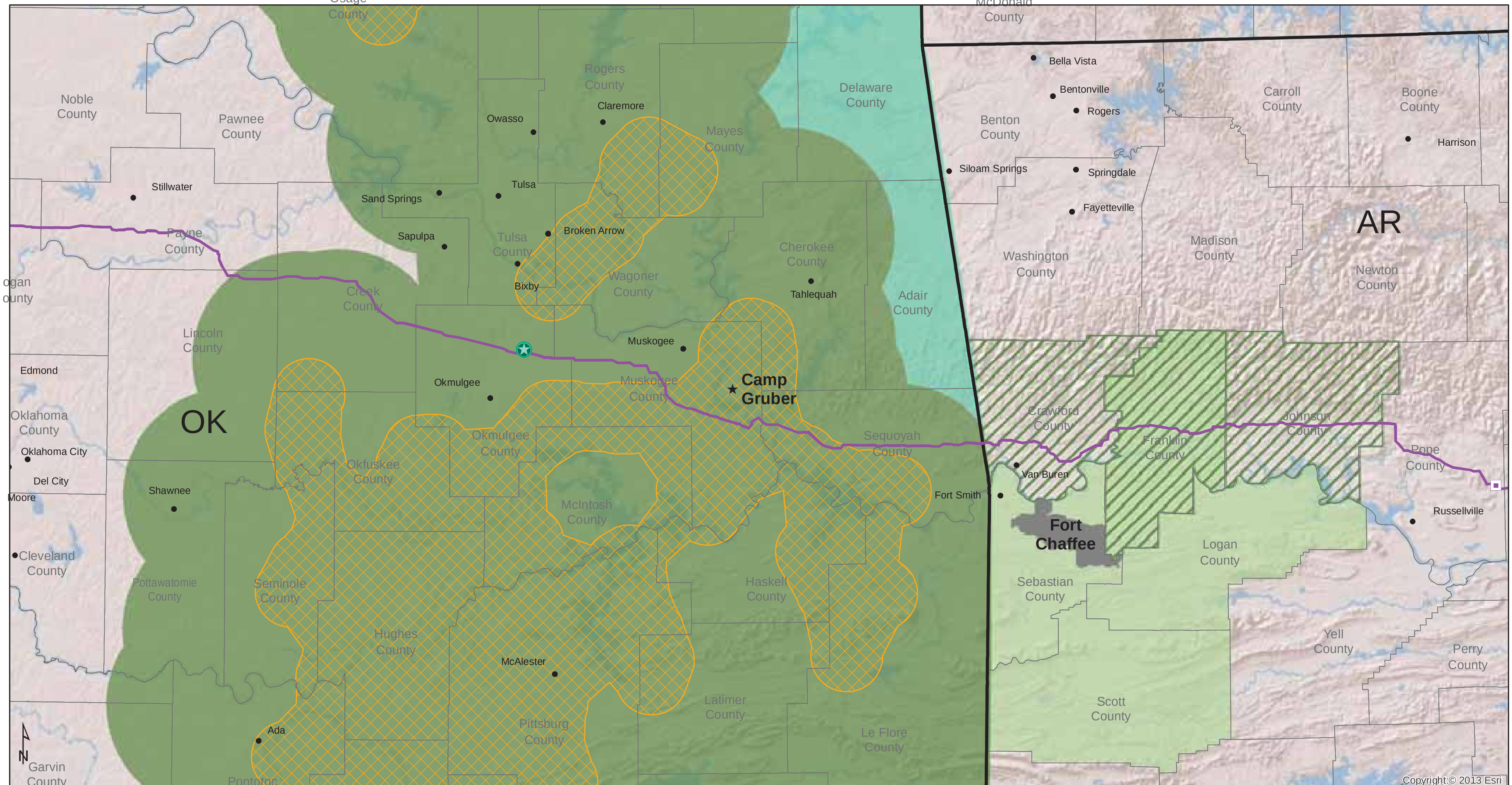


Legend

Proposed Route

Converter Station

American Burying Beetle Oklahoma Range (1)

Potential American Burying Beetle Oklahoma Range (1)

American Burying Beetle Oklahoma Conservation Priority Areas (1)

Project Counties with Potential American Burying Beetle Presence (3)

Counties with American Burying Beetle in Arkansas (2)

American Burying Beetle Survey location (Positive Result) (4)

0 20

Miles

Figure 5.3-1

Potential Presence of
American Burying Beetle in the Action Area

PLAINS & EASTERN
CLEAN LINE

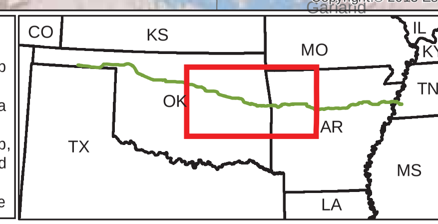
Notes / Sources:

(1) USFWS 2014b

(2) USFWS 2014a

(3) USFWS 2013b, USFWS 2014d

(4) USFWS 2014e



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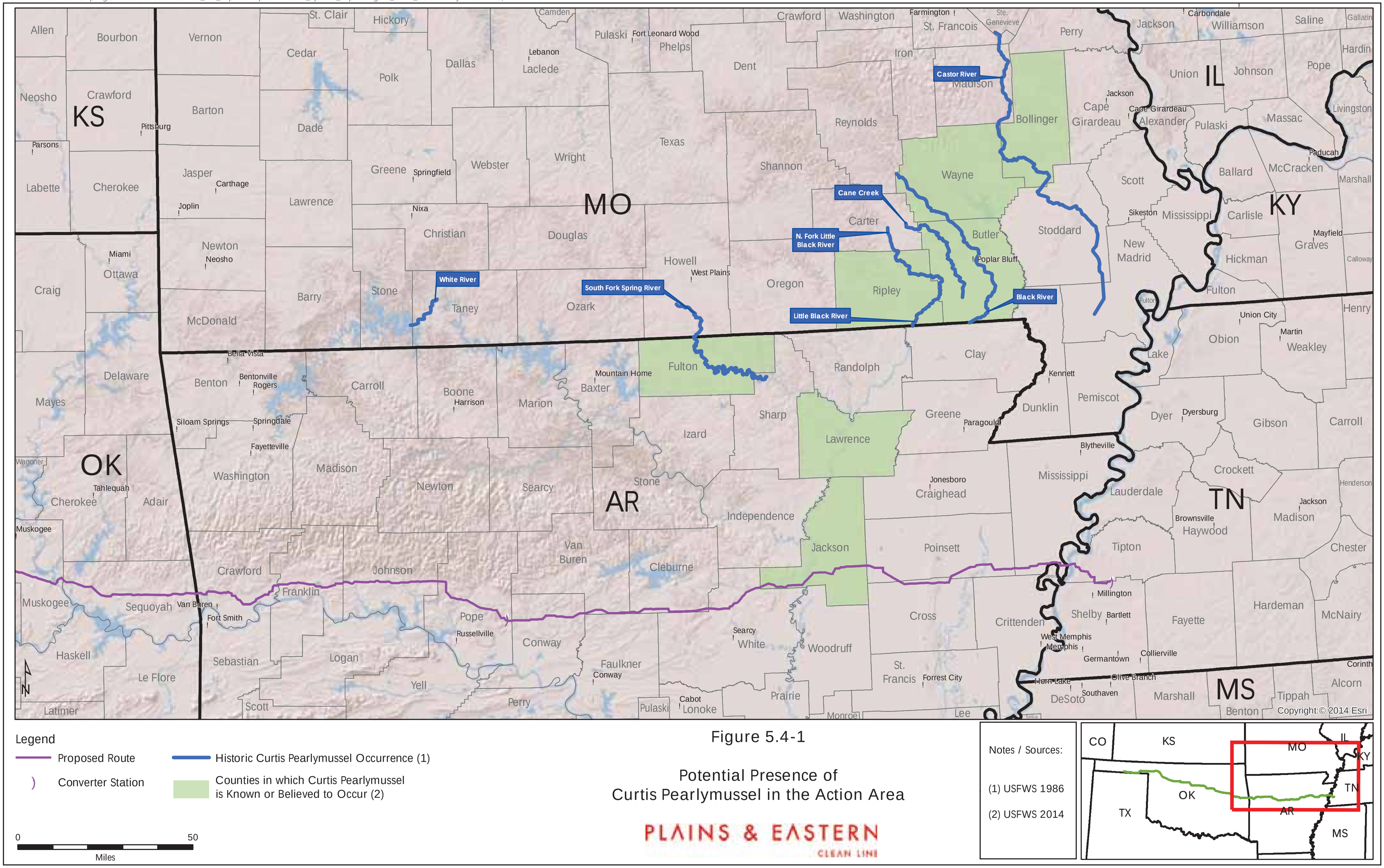

Figure 5.4-1

Potential Presence of
Curtis Pearlymussel in the Action Area

PLAINS & EASTERN
CLEAN LINE

Figure 5.6-1 (Omitted)

DISCLAIMER: Upon consultation with the U.S. Fish and Wildlife Service, the publicly released document has been redacted to omit the identified pages which relate to potential species habitats and occurrence in order to protect sensitive species from disturbance.

Figure 5.8-1 (Omitted)

DISCLAIMER: Upon consultation with the U.S. Fish and Wildlife Service, the publicly released document has been redacted to omit the identified pages which relate to potential species habitats and occurrence in order to protect sensitive species from disturbance.

Figure 5.9-1 (Omitted)

DISCLAIMER: Upon consultation with the U.S. Fish and Wildlife Service, the publicly released document has been redacted to omit the identified pages which relate to potential species habitats and occurrence in order to protect sensitive species from disturbance.

Figure 5.10-1 (Omitted)

DISCLAIMER: Upon consultation with the U.S. Fish and Wildlife Service, the publicly released document has been redacted to omit the identified pages which relate to potential species habitats and occurrence in order to protect sensitive species from disturbance.

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Legend

- Proposed Route
- Converter Station
- Rivers with Known Snuffbox Occurrence (1)
- Counties with Reported Snuffbox Occurrence Crossed by the Project (2)
- Counties with Potential Snuffbox Occurrence Crossed by the Project (3)
- Counties with Potential Snuffbox Occurrence (3)

0 25
Miles

Figure 5.11-1

Snuffbox Range in the Vicinity of the Project

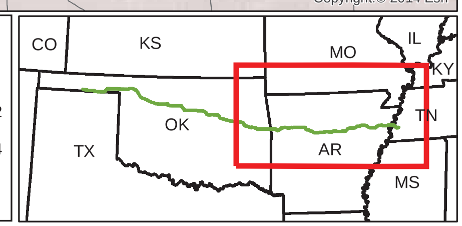
PLAINS & EASTERN CLEAN LINE

Notes / Sources:

(1) USFWS 2012

(2) USFWS 2014

(3) NatureServe 2014



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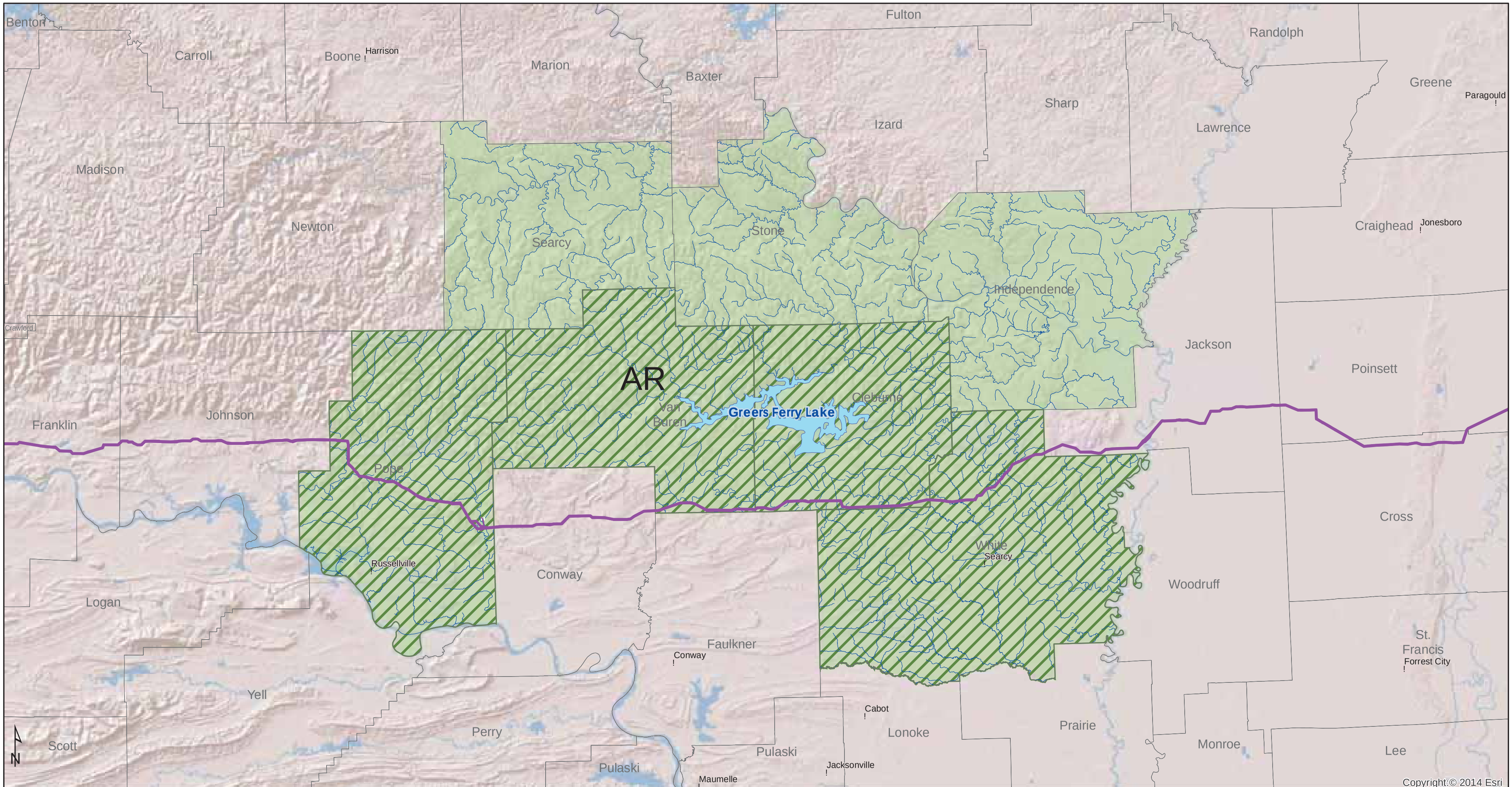


Legend

- Proposed Route
- Converter Station
- Known or Potential Occurrence of Speckled Pocketbook (1)
- Counties with Speckled Pocketbook Occurrence (1)
- Counties Crossed by the Project with Speckled Pocketbook Occurrence (2)

0 25
Miles

Figure 5.12-1

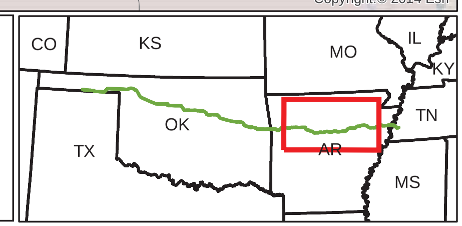
Potential Presence of Speckled Pocketbook in the Action Area

PLAINS & EASTERN
CLEAN LINE

Notes / Sources:

(1) USFWS 2013, USFWS 2014

(2) USFWS 2013



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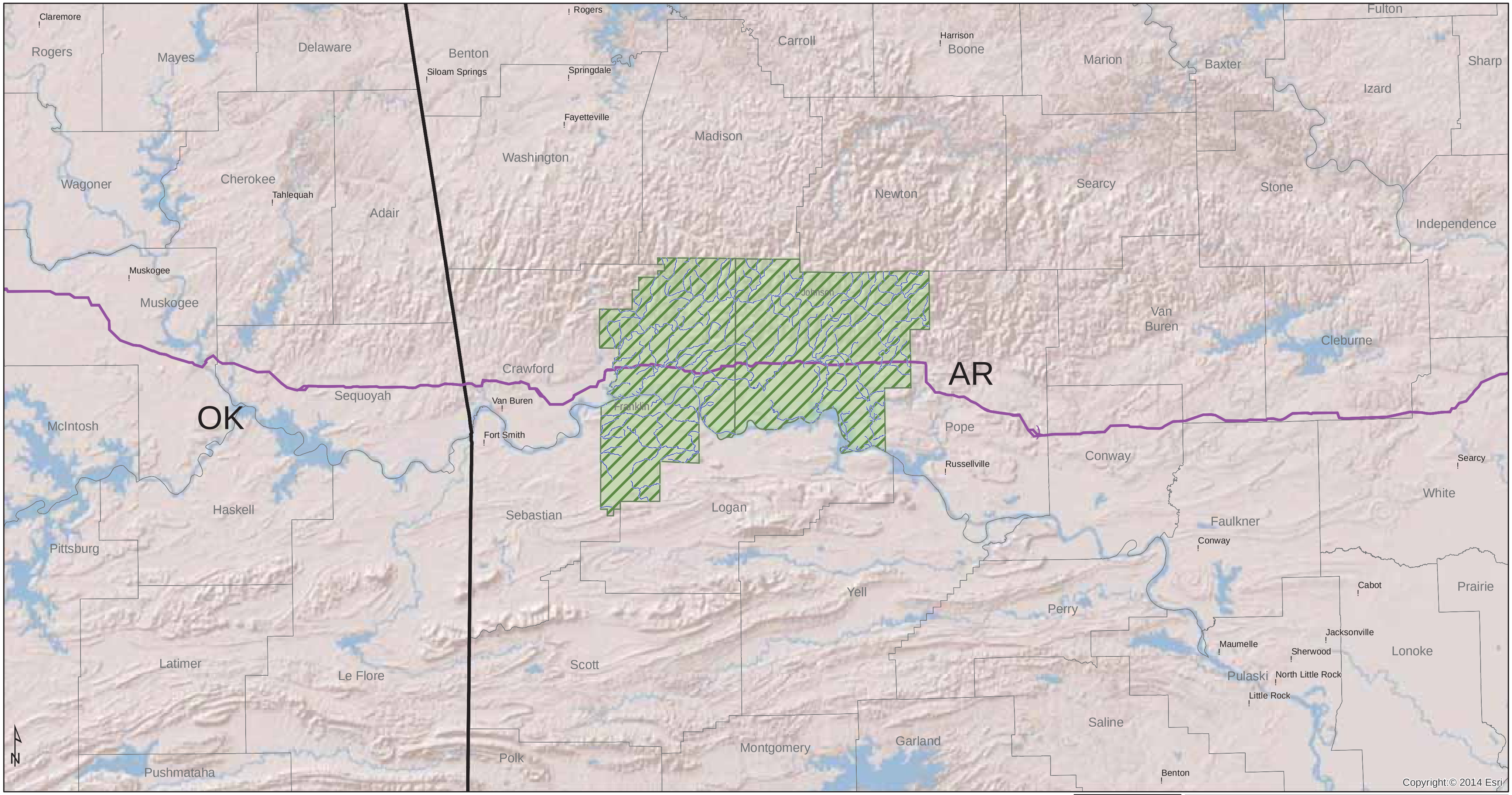


Legend

- Proposed Route
- Converter Station
- Known or Potential Occurrence of Spectaclecase (1)
- Counties Crossed by the Project with Spectaclecase Occurrence (2)
- Counties with Spectaclecase Occurrence (3)

0 25
Miles

Figure 5.13-1

Potential Presence of Spectaclecase in the Action Area

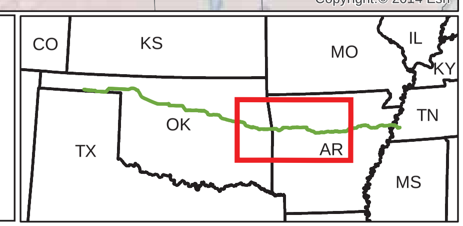
PLAINS & EASTERN
CLEAN LINE

Notes / Sources:

(1) USFWS 2013c, USFWS 2014b

(2) USFWS 2014b

(3) USFWS 2013c



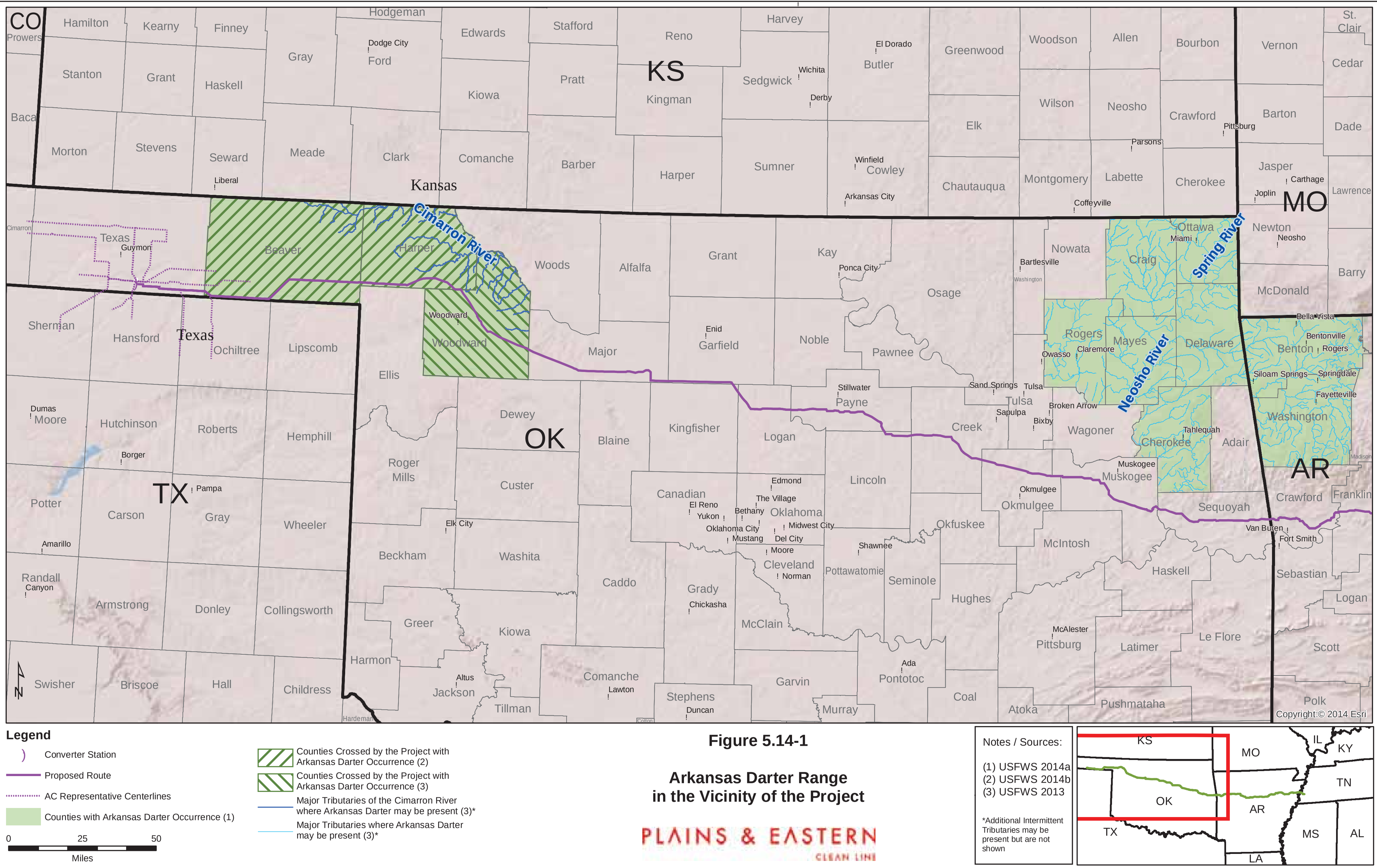


Figure 5.14-1

Arkansas Darter Range in the Vicinity of the Project

PLAINS & EASTERN CLEAN LINE

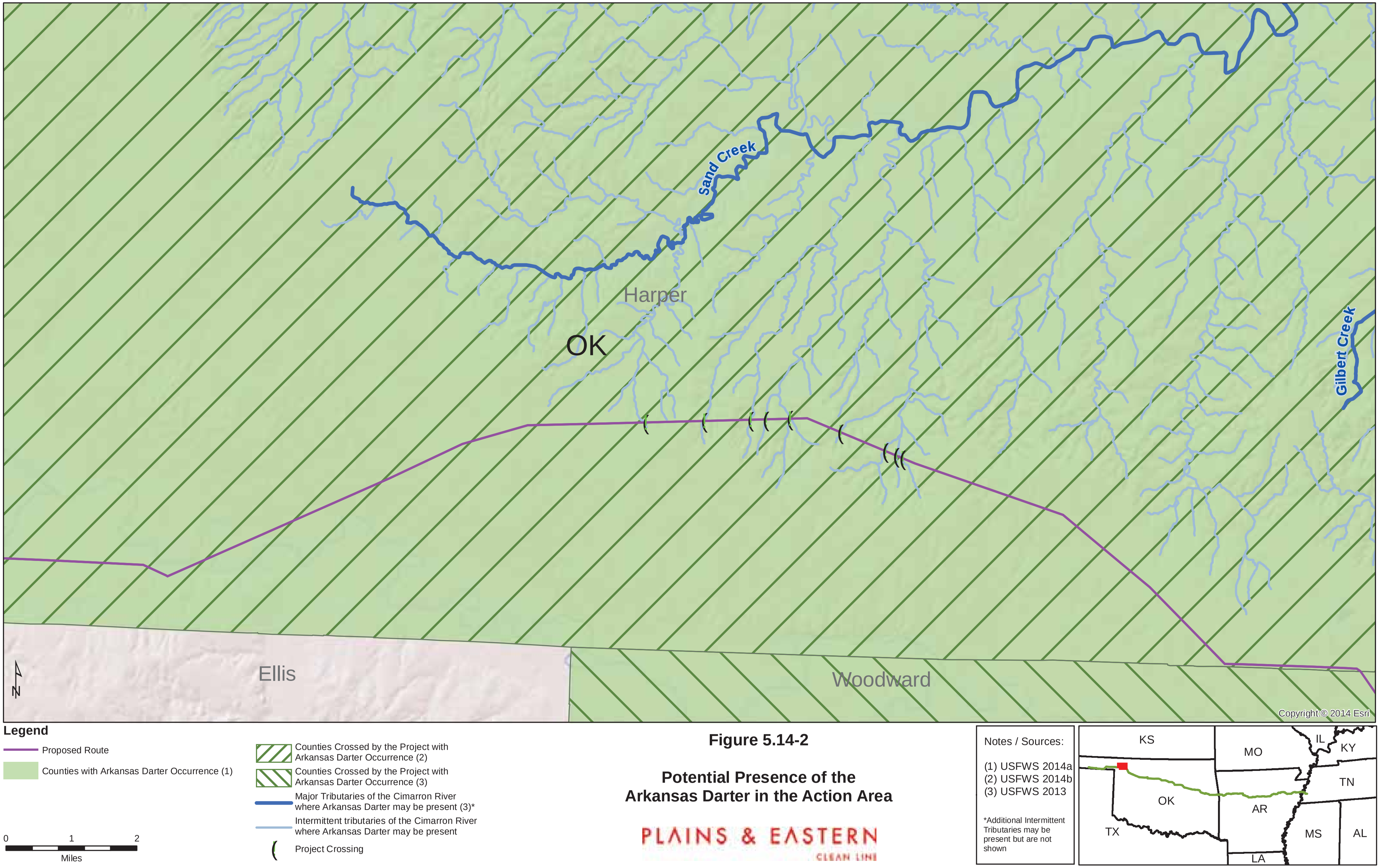


Figure 5.14-2

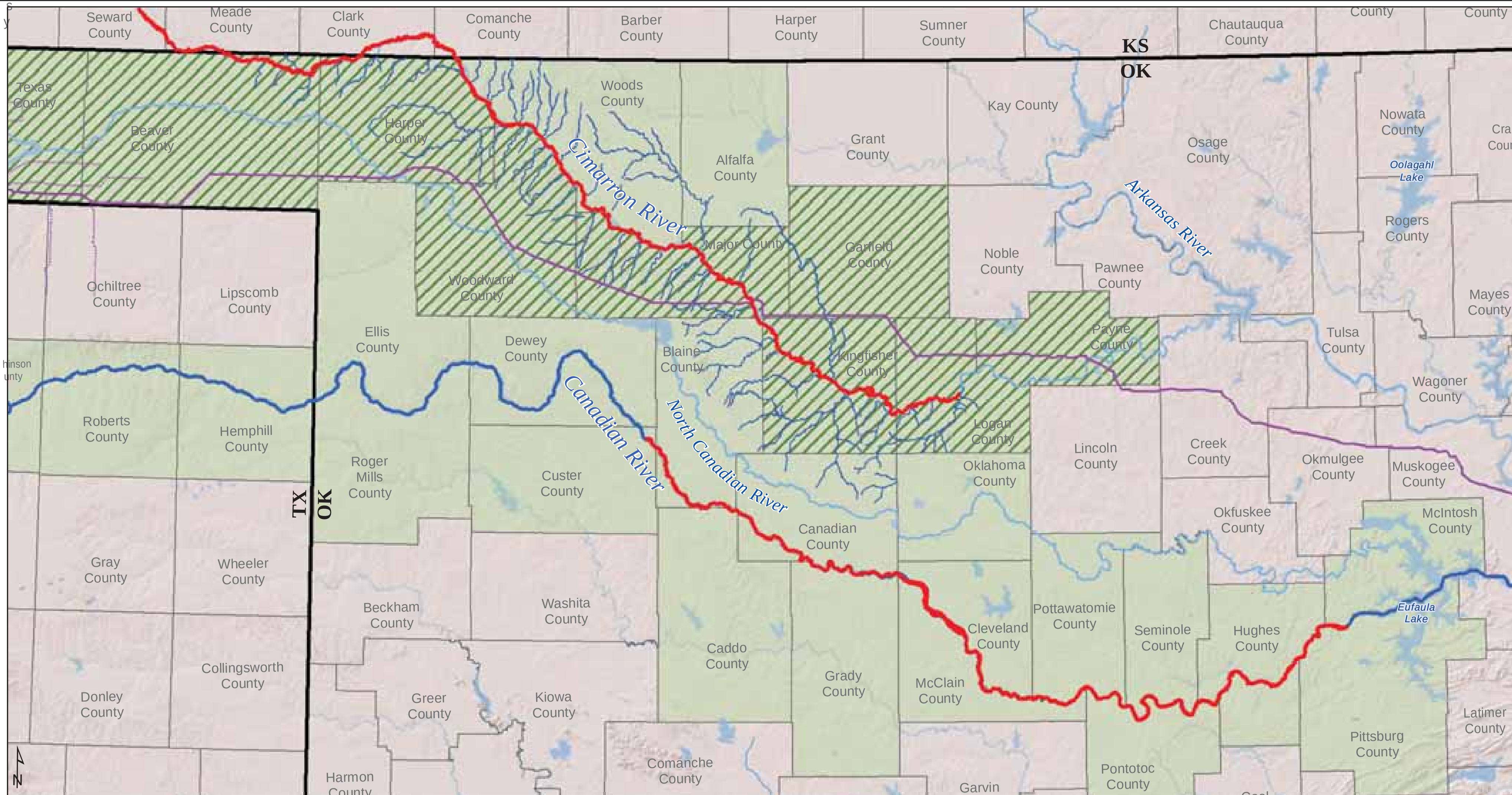
Potential Presence of the Arkansas Darter in the Action Area

PLAINS & EASTERN CLEAN LINE

Notes / Sources:

(1) USFWS 2014a
(2) USFWS 2014b
(3) USFWS 2013

*Additional Intermittent Tributaries may be present but are not shown



Legend

- Proposed Route
- AC Representative Centerlines
- Counties with Arkansas River Shiner Occurrence (1)
- Counties with Arkansas River Shiner Occurrence where Project Footprint Crosses the Cimarron River or Upstream Tributaries (2)
- Known or Potential Occurrence of Arkansas River Shiner (1, 2)*
- USFWS Critical Habitat for Arkansas River Shiner (3)
- Major Tributaries of the Cimarron River where Arkansas River Shiner may be present*

0 5 10 20 30 40
Miles

Notes / Sources:

(1) USFWS 2014a
(2) USFWS 2013
(3) USFWS 2005

*Additional Intermittent Tributaries may be present but are not shown

Figure 5.15-1

Arkansas River Shiner Range in the Vicinity of the Project

PLAINS & EASTERN CLEAN LINE

Figure 5.17-1

Pallid Sturgeon Range

PLAINS & EASTERN CLEAN LINE

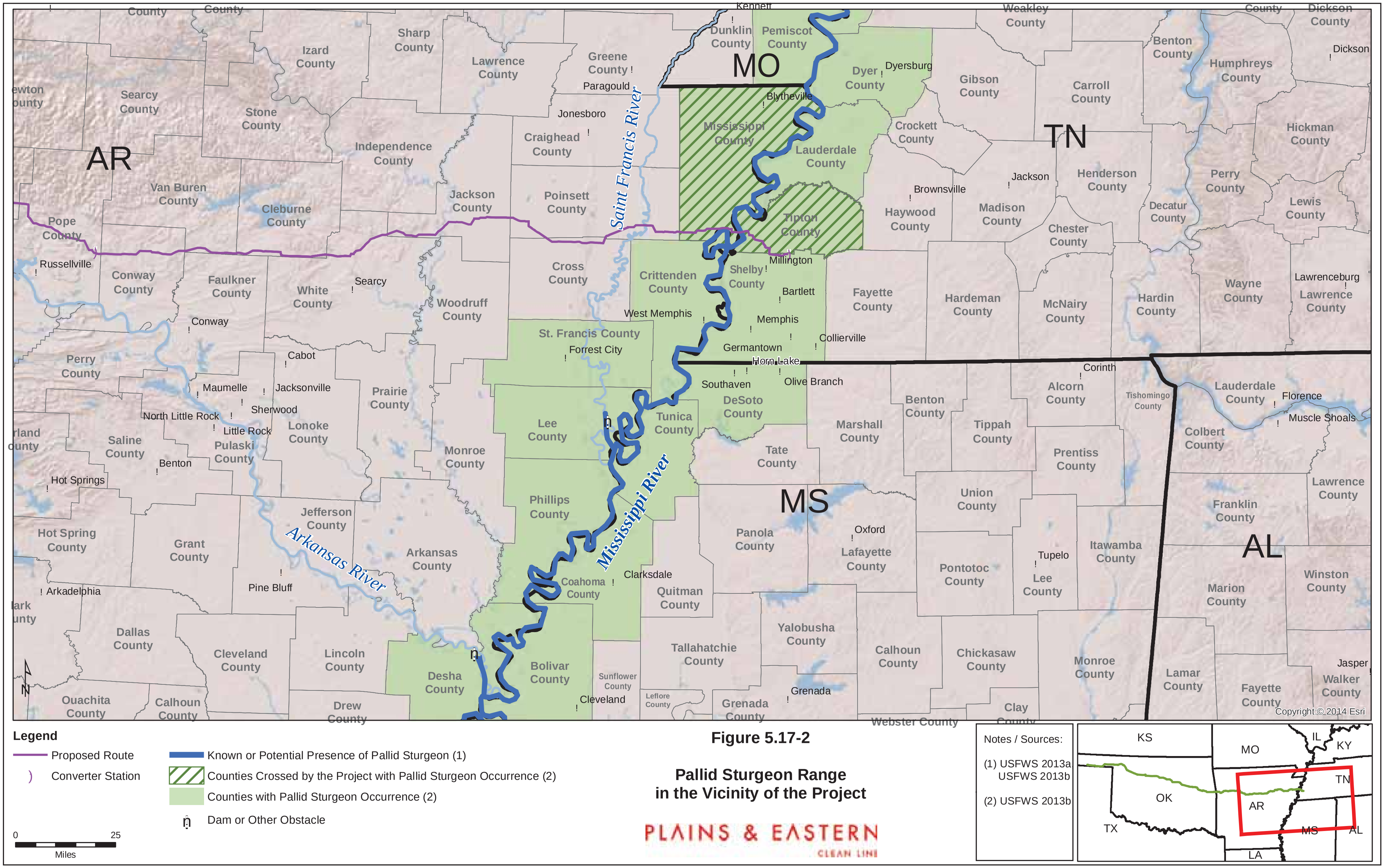


Figure 5.17-2

Pallid Sturgeon Range in the Vicinity of the Project

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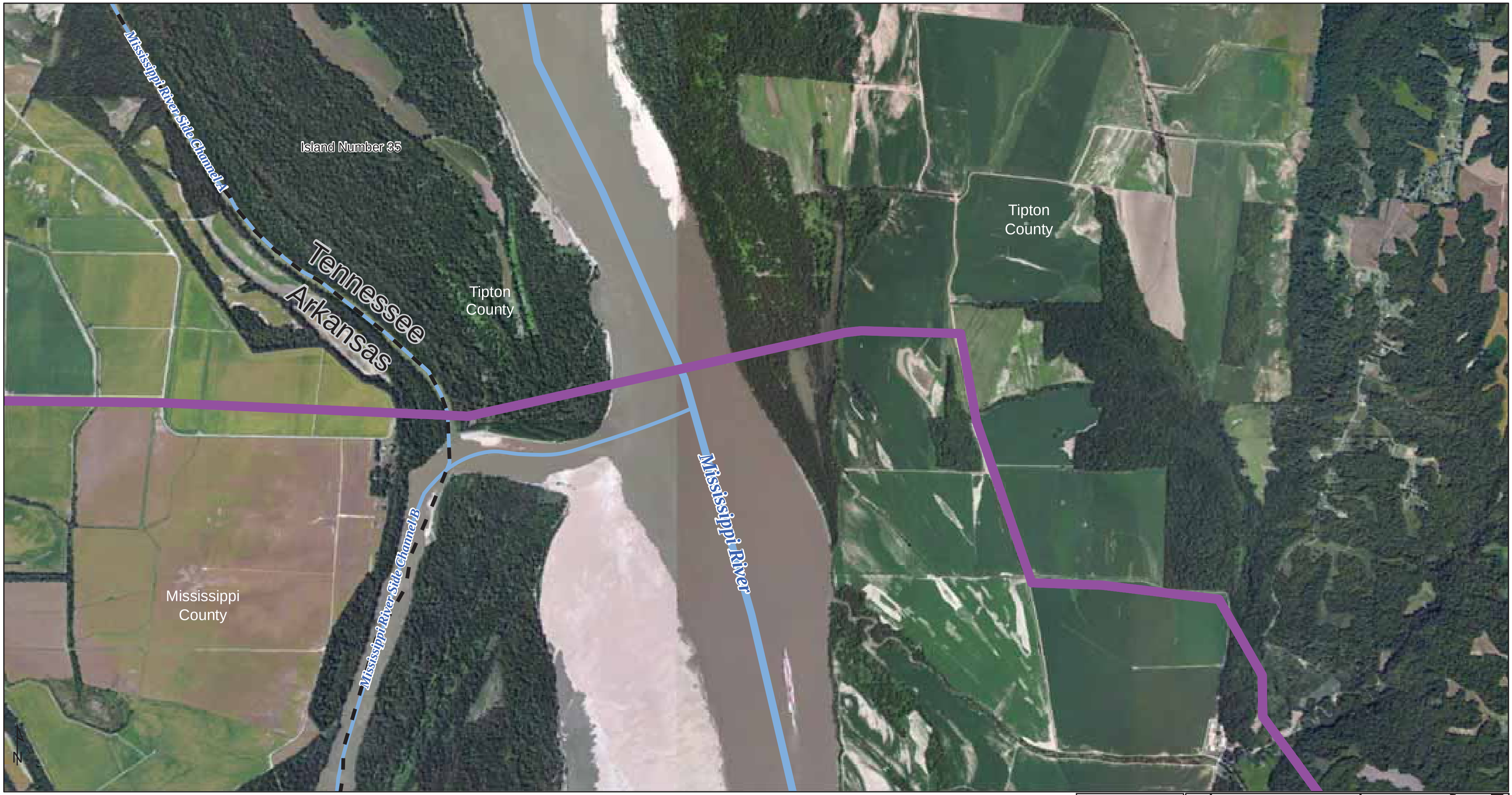

Legend

- Proposed Route
- Known Occurence of Pallid Sturgeon (1)
- Potential Occurence of Pallid Sturgeon (1)
- State Boundary

0 0.5 1
Miles

Figure 5.17-3

Potential Presence of Pallid Sturgeon in the Action Area

PLAINS & EASTERN CLEAN LINE

Notes / Sources:

(1) USFWS 2013a, USFWS 2013b

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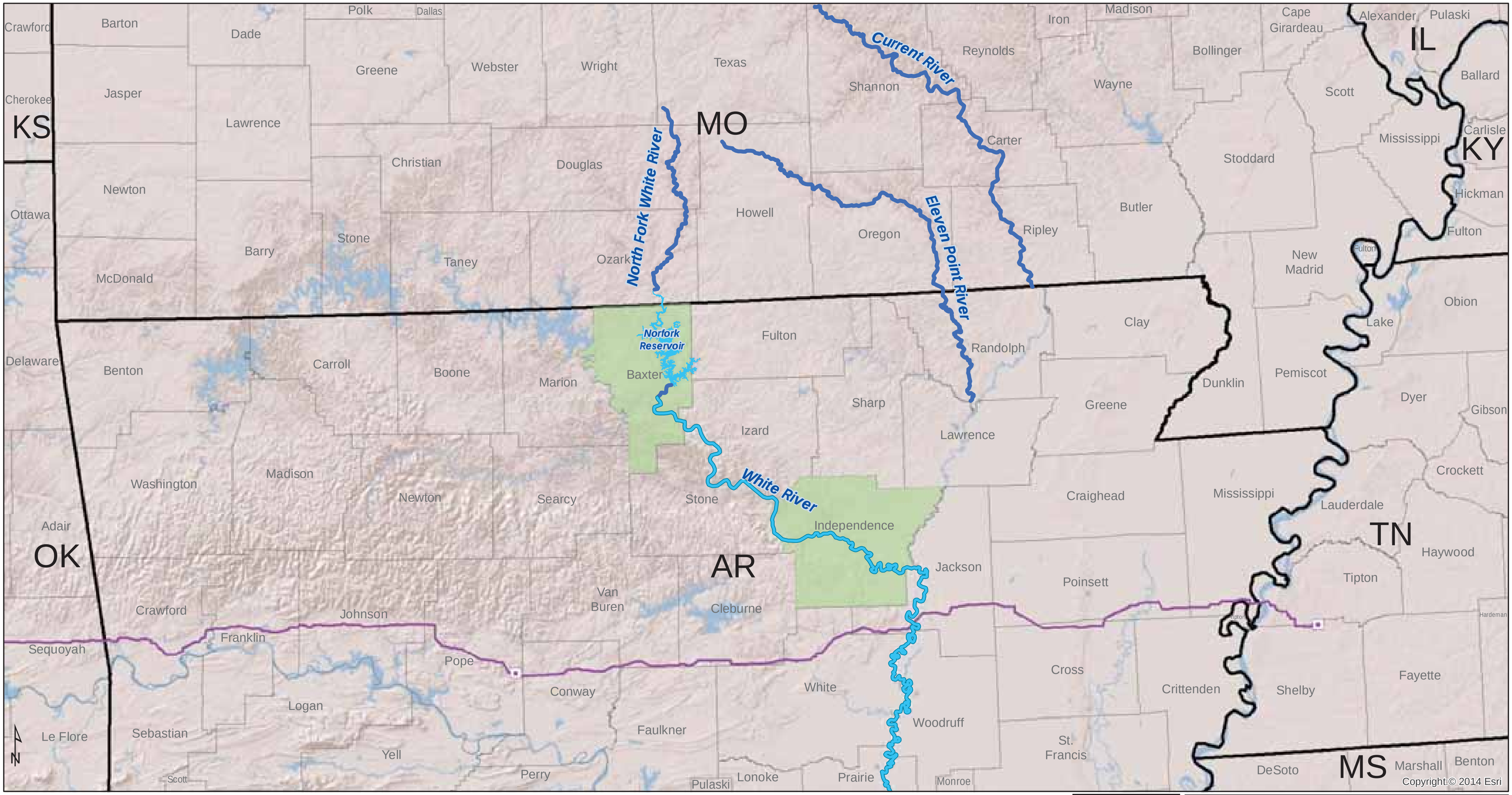


Legend

- Converter Station
- Proposed Route
- Rivers in which Ozark Hellbenders are Currently Known to Occur (1)
- Potentially supports Ozark Hellbender (2)
- Records of Ozark Hellbenders in the Main Stem of White River (3)

0 — 50 Miles

Figure 5.19-1

Range of Ozark Hellbender

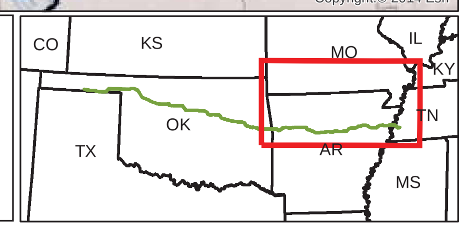
PLAINS & EASTERN CLEAN LINE

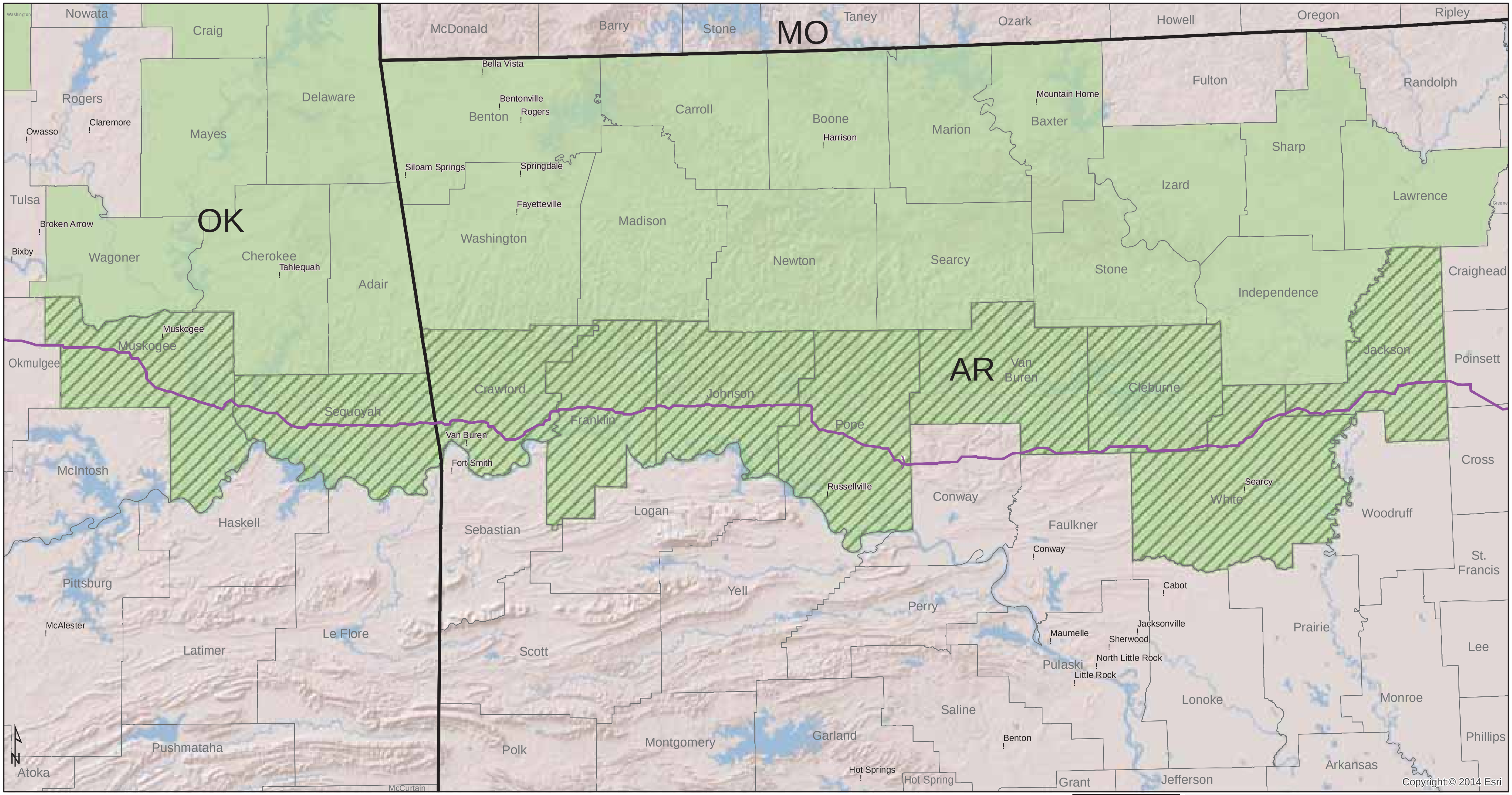
Notes / Sources:

(1) USFWS 2011a, 2012

(2) USFWS 2011a

(3) USFWS 2011a





Legend

- Proposed Route
- Converter Station
- Counties Crossed by the Project with Gray Bat Occurrence (1)
- Counties in which the Gray Bat is Known to or Believed to Occur (2)

0 50
Miles

Figure 5.21-1

Potential Presence of Gray Bat in the Action Area

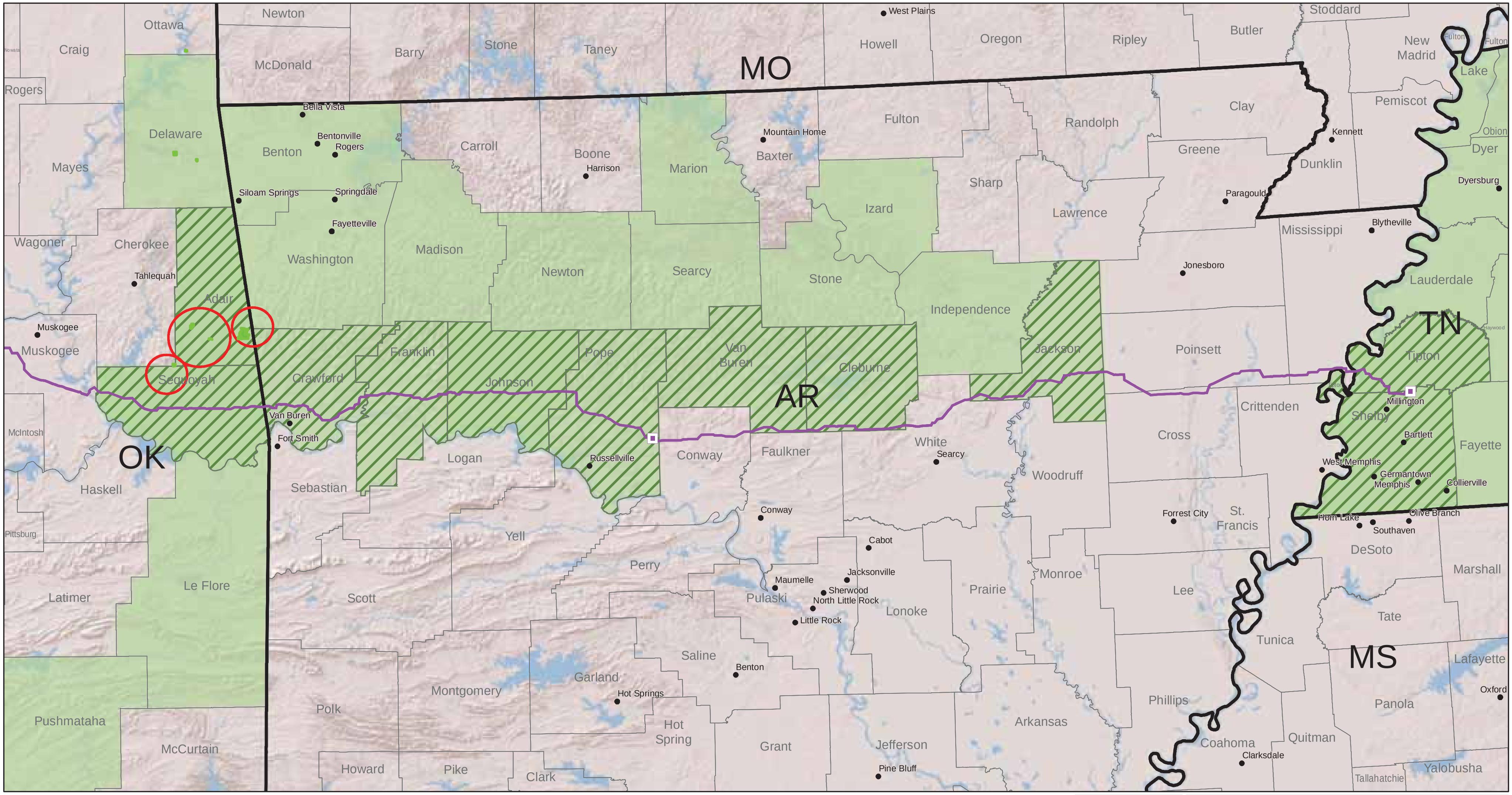
PLAINS & EASTERN CLEAN LINE

Notes / Sources:

(1) USFWS 2014b

(2) USFWS 2014c

Document Path: \\Prtbhp1\gis\Buffalo\Cleanline\Birds_Bio_Report\Maps\MXDs\Bio_Species_Report\Figure_5.22-1_IndianaBat_Presence.mxd, 3/26/2015



Legend

- Proposed Route
- Converter Station
- Area of Potential Bat Caves (A)
- Counties Crossed by the Project with Potential Indiana Bat Occurrence (B)
- Counties in which the Indiana Bat is known to or believed to Occur (C)
- Ozark Plateau NWR (D)

0 25
Miles

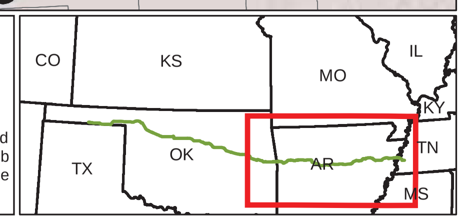
Figure 5.22-1

Potential Presence of Indiana Bat in the Action Area

PLAINS & EASTERN CLEAN LINE

Notes / Sources:

(A) The Nature Conservancy Oklahoma 2002
(B) USFWS 2013d
(C) USFWS 2014b
(D) USFWS 2013e



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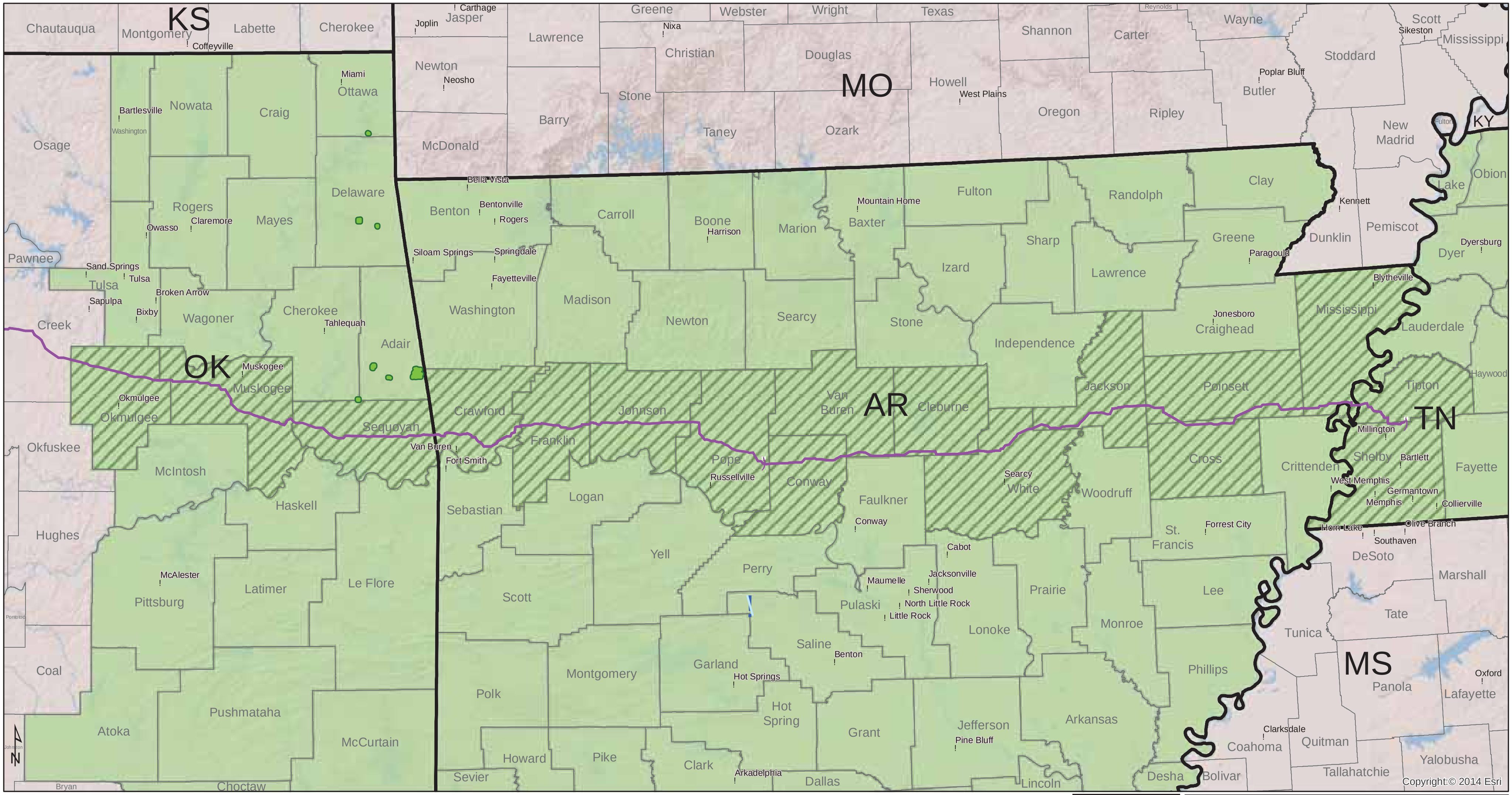


Legend

- Proposed Route
- AC Representative Centerlines
- Converter Station
- Ouachita Mountains Northern Long-eared Bat Study Area (1)
- Ozark Plateau National Wildlife Refuge (2)
- Counties in which the Northern Long-eared Bat is Known or Believed to Occur (3)
- Counties Crossed by the Project in which the Northern Long-eared Bat is Known or Believed to Occur (3)

0 10 20 30 40
Miles

Figure 5.23-1

Potential Presence of Northern Long-eared Bat in the Action Area

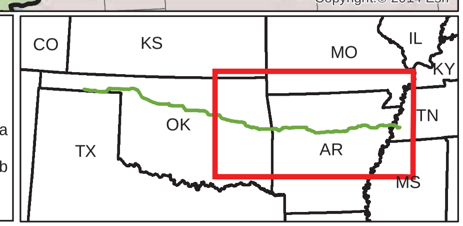
PLAINS & EASTERN
CLEAN LINE

Notes / Sources:

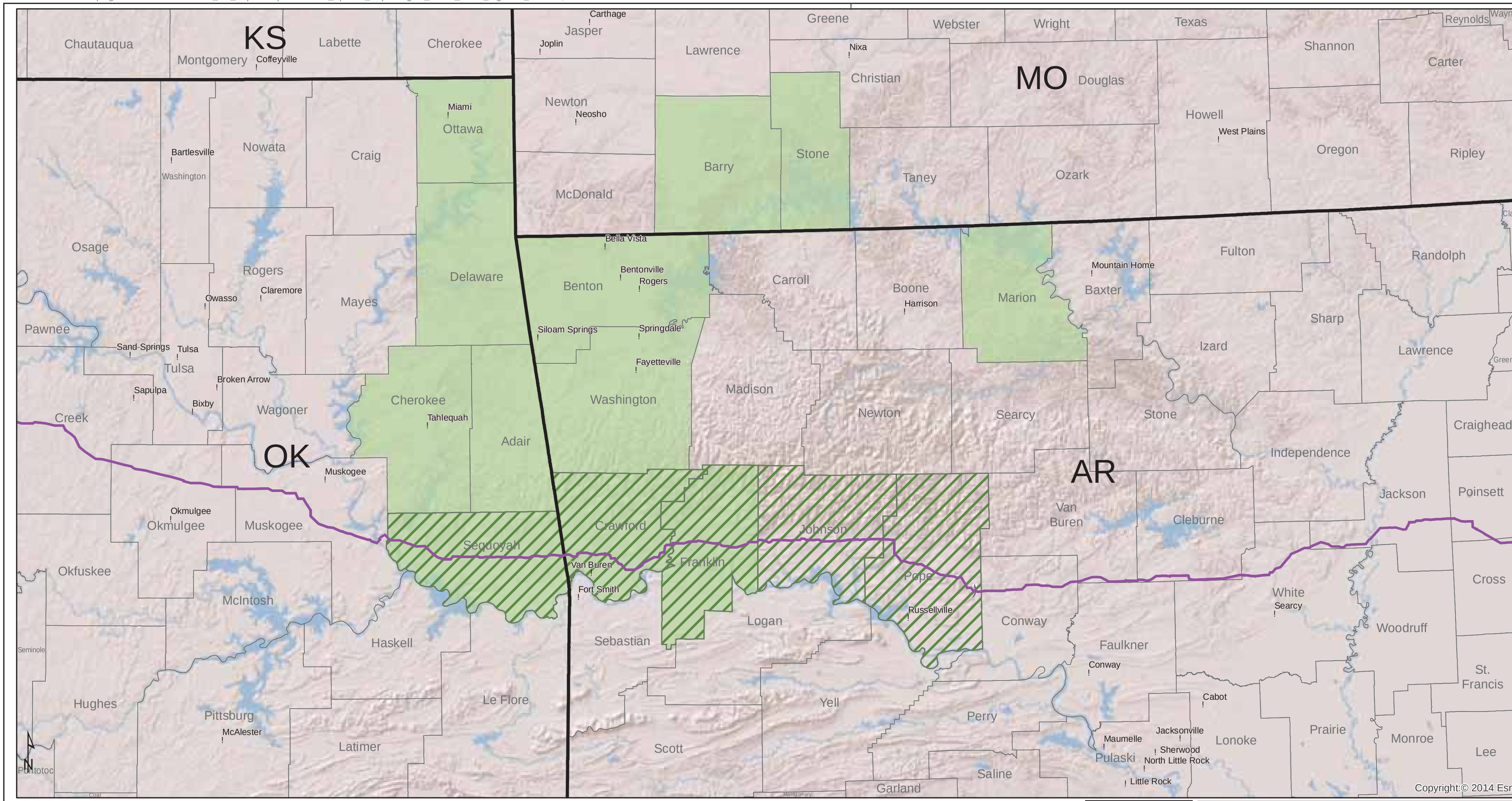
(1) Perry and Thill 2007

(2) USFWS 2013a

(3) USFWS 2014b



Document Path: \\Prtbhp1\gis\Buffalo\Cleanline\Birds_Bio_Report\Maps\MXDs\Bio_Species_Report\Figure_5.24-1_Ozark_Bigeared_Bat.mxd, 11/19/2014



Legend

Proposed Route

Converter Station

Counties Crossed by the Project in which the Ozark Big-eared Bat is Known or Believed to Occur (1)

Counties in which the Ozark Big-eared Bat is Known or Believed to Occur (2)

0 50

Miles

Figure 5.24-1

Potential Presence of Ozark Big-eared Bat in the Action Area

PLAINS & EASTERN CLEAN LINE

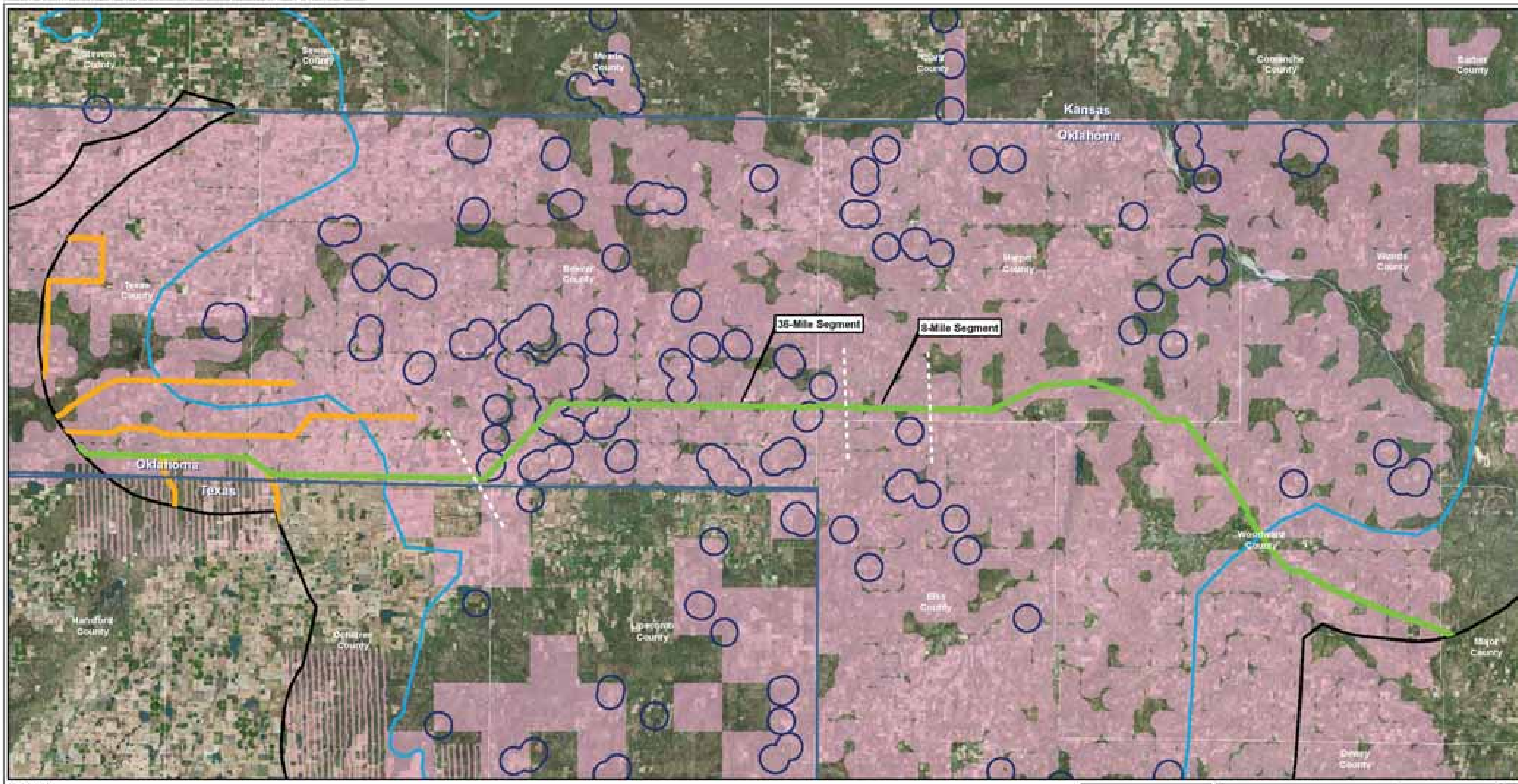
Notes / Sources:

(1) USFWS 2014a

(2) USFWS 2014b

Figure 5.25-1 (Omitted)

DISCLAIMER: Upon consultation with the U.S. Fish and Wildlife Service, the publicly released document has been redacted to omit the identified pages which relate to potential species habitats and occurrence in order to protect sensitive species from disturbance.



Legend

- LEPC Action Area for HVDC Line
- LEPC Action Area for HVAC Lines
- LEPC Estimated Occupied Range +10 Miles
- LEPC Current Estimated Occupied Range
- Lek Location
- LEPC survey areas

0 10 Miles

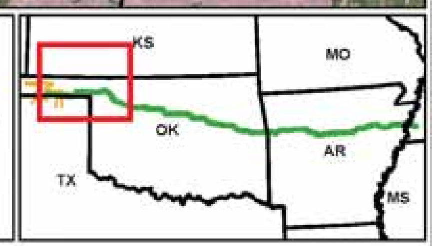
Figure 5.26-1

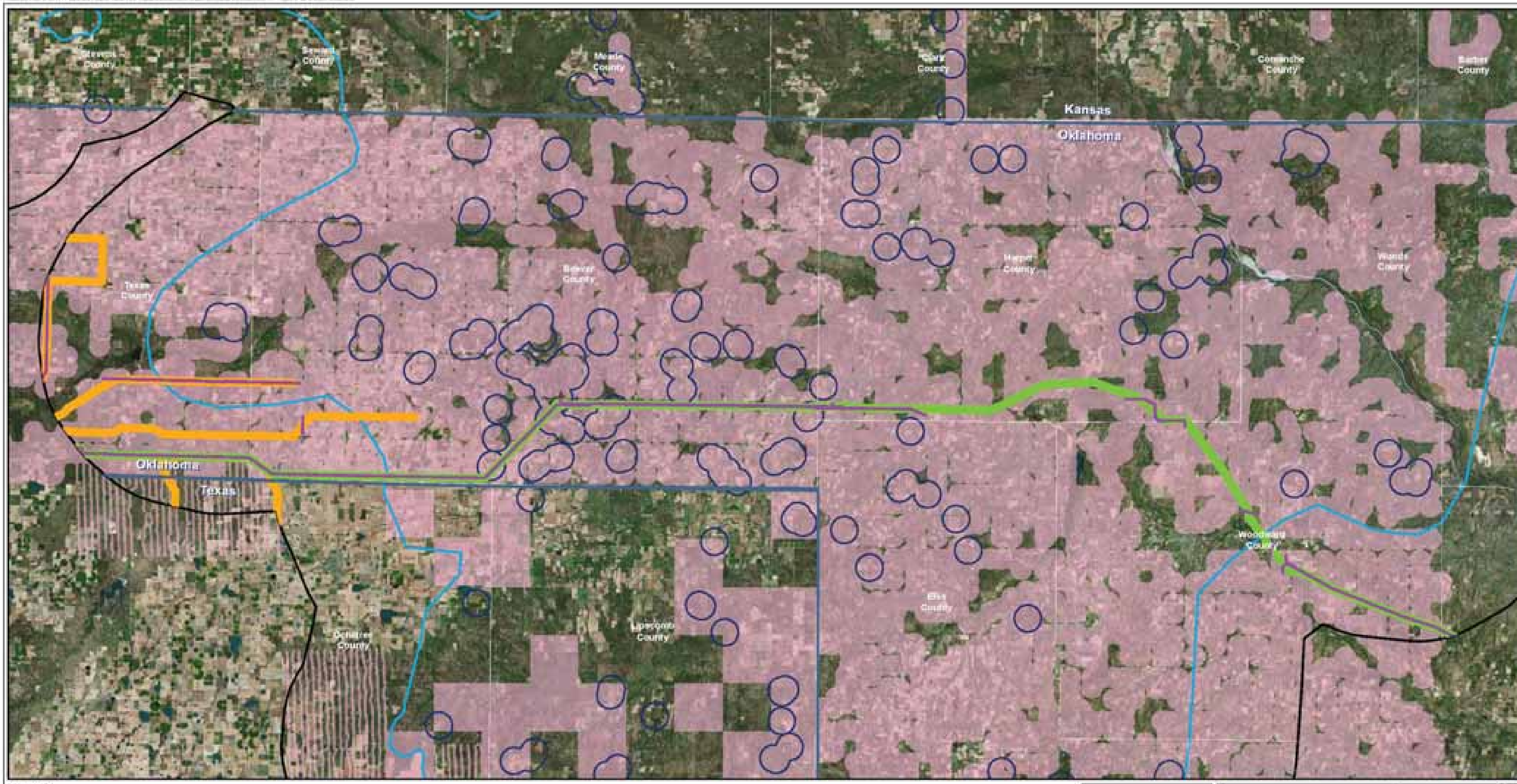
LEPC Survey Coverage and Known Lek Locations in the Action Area Region

PLAINS & EASTERN
CLEAN LINE

Notes / Sources:

KU Southern Great Plains Crucial Habitat Assessment Tool, 2014.





Legend

- Existing Transmission Line
- LEPC Action Area for HVAC Lines
- LEPC Action Area for HVDC Line
- LEPC Estimated Occupied Range +10 Miles
- LEPC Current Estimated Occupied Range
- Lek Location
- LEPC survey areas

0 10 Miles

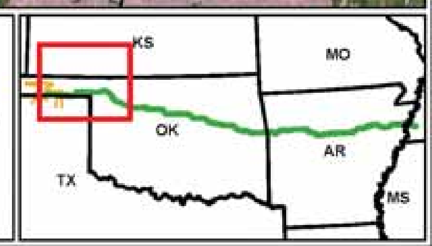
Figure 5.26-2

Locations of Existing Transmission Line Alignments in the Action Area

PLAINS & EASTERN CLEAN LINE

Notes / Sources:

KU Southern Great Plains Crucial Habitat Assessment Tool, 2014.



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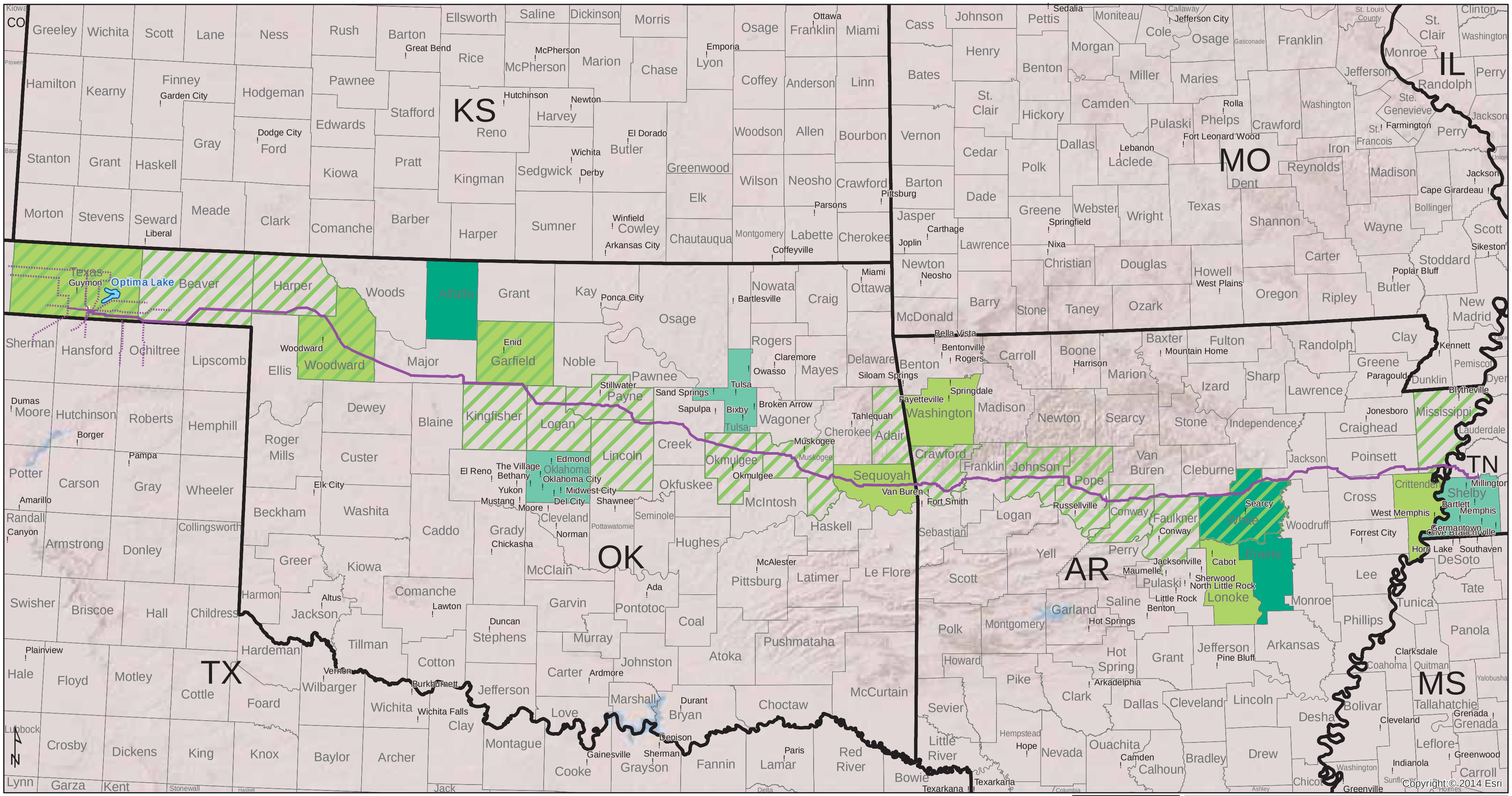


Legend

- Proposed Route
- AC Representative Centerlines
- Converter Station
- Optima Lake (1)
- Counties Crossed by the Project with Piping Plover Occurrence (2)

Total eBird Observations in the Project and Adjacent Counties (3)

- 1 - 3
- 10 - 20
- 25 - 94

0 25 50 75 100
Miles

Figure 5.27-1

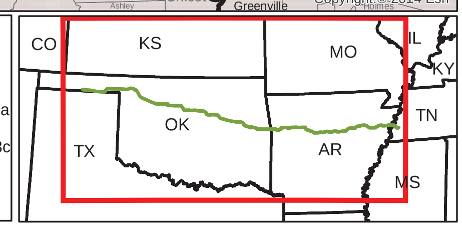
Potential Presence of Piping Plover in the Action Area

Notes / Sources:

(1) Boyd 1991 & USFWS 2013a

(2) USFWS 2013c

(3) eBird 2014



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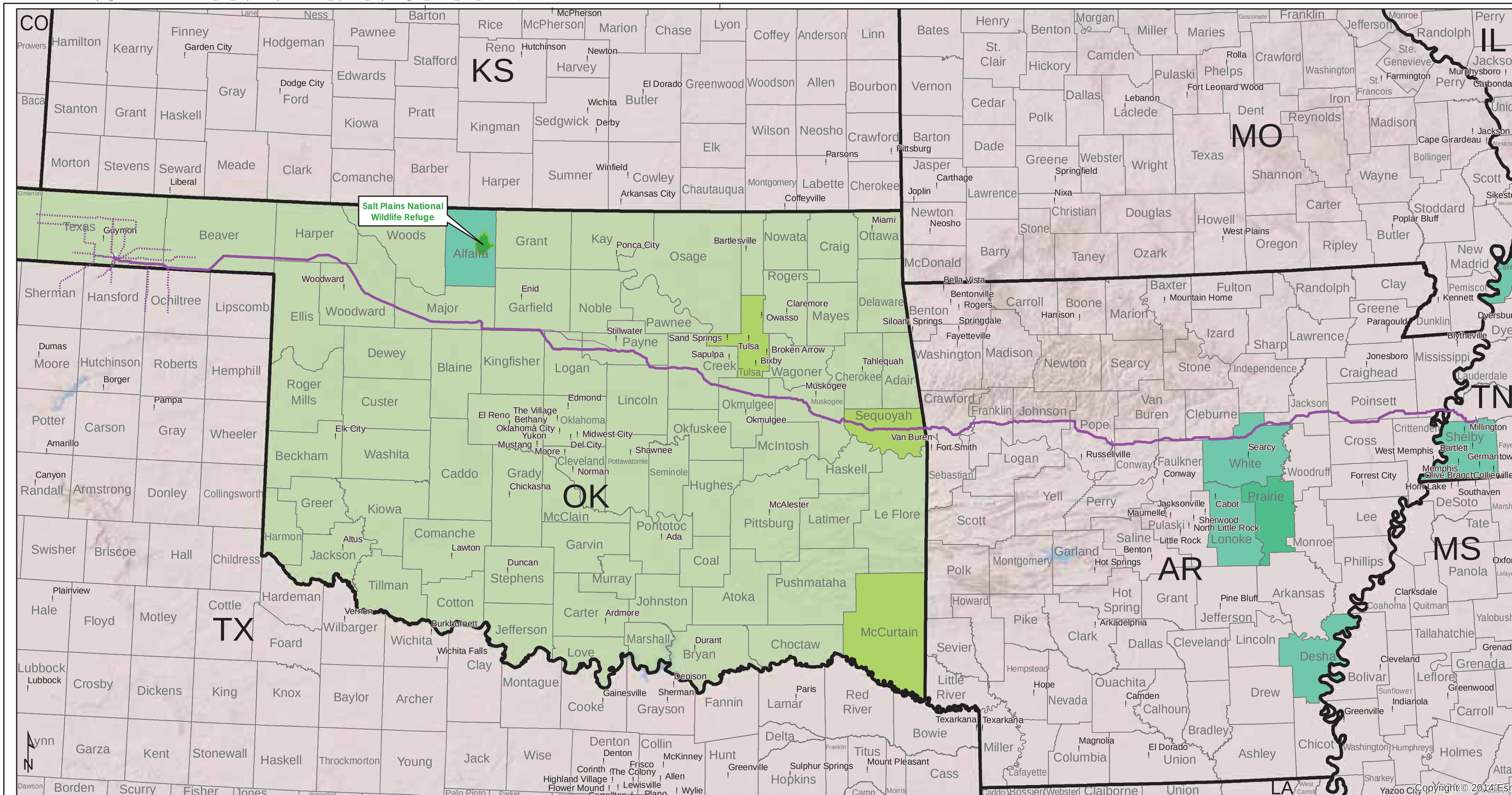


Legend

- Proposed Route
- AC Representative Centerlines
- Converter Station
- Counties in which the Red Knot is Known or Believed to Occur (1)

Total eBird Observations (2)

- 1
- 2 - 5
- 6 - 15

0 50
Miles

Figure 5.28-1

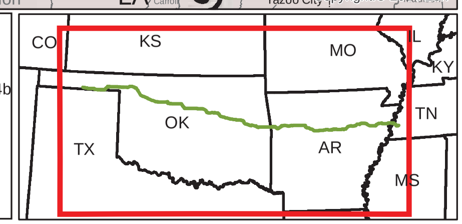
Potential Presence of Red Knot the Action Area

PLAINS & EASTERN
CLEAN LINE

Notes / Sources:

(1) USFWS 2014b

(2) eBird 2014



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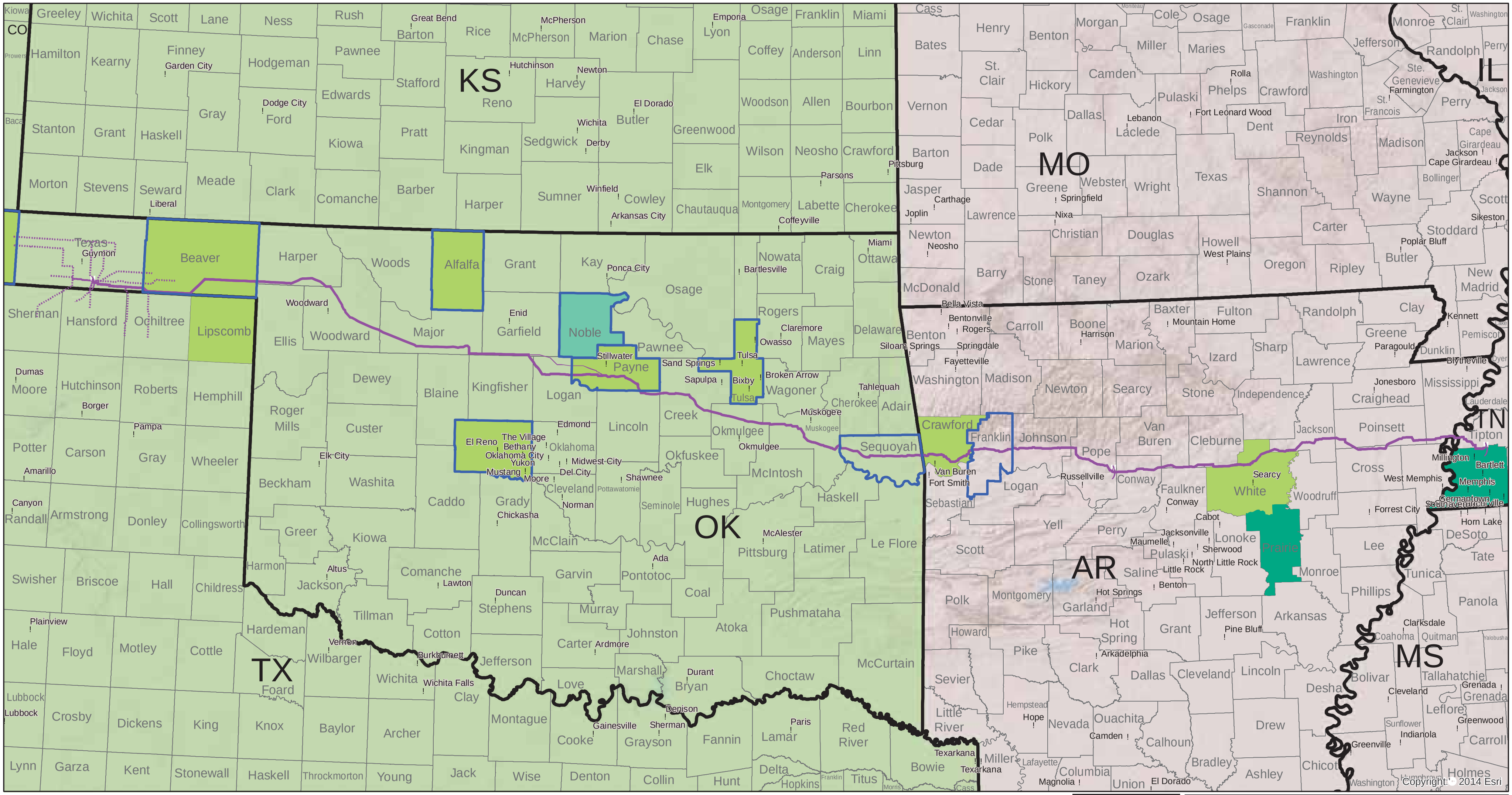


Legend

- Proposed Route
- AC Representative Centerlines
- Converter Station
- Counties with Sprague's Pipit Occurrence (1)
- Sprague s Pipit Migration Corridor (2)

Total eBird Observations in the Project and Adjacent Counties (3)

- 1 - 5
- 18
- 45 - 61

0 50
Miles

Figure 5.29-1

Potential Presence of Sprague's Pipit the Action Area

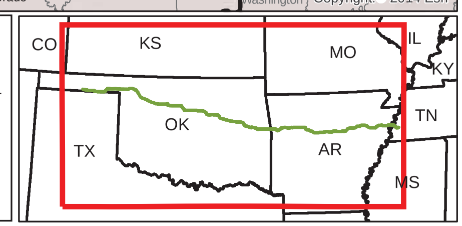
PLAINS & EASTERN CLEAN LINE

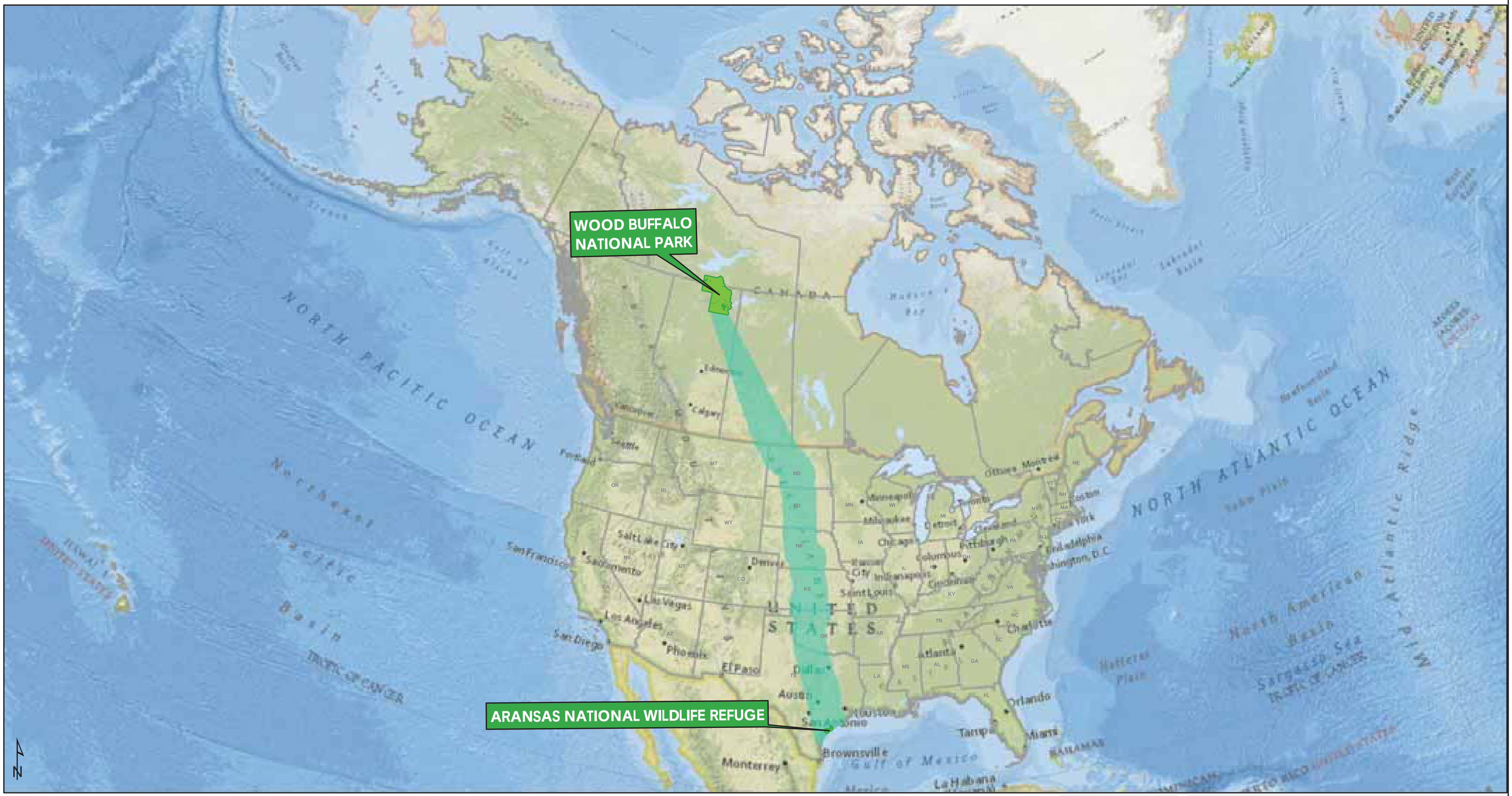
Notes / Sources:

(1) USFWS 2014

(2) Jones 2010

(3) eBird 2014





Legend

Whooping Crane Migration Corridor (1)

0 250 500
Miles

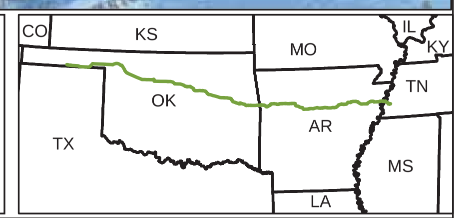
Figure 5.30-1

Whooping Crane Migration

PLAINS & EASTERN CLEAN LINE

Notes / Sources:

(1) USFWS 2009



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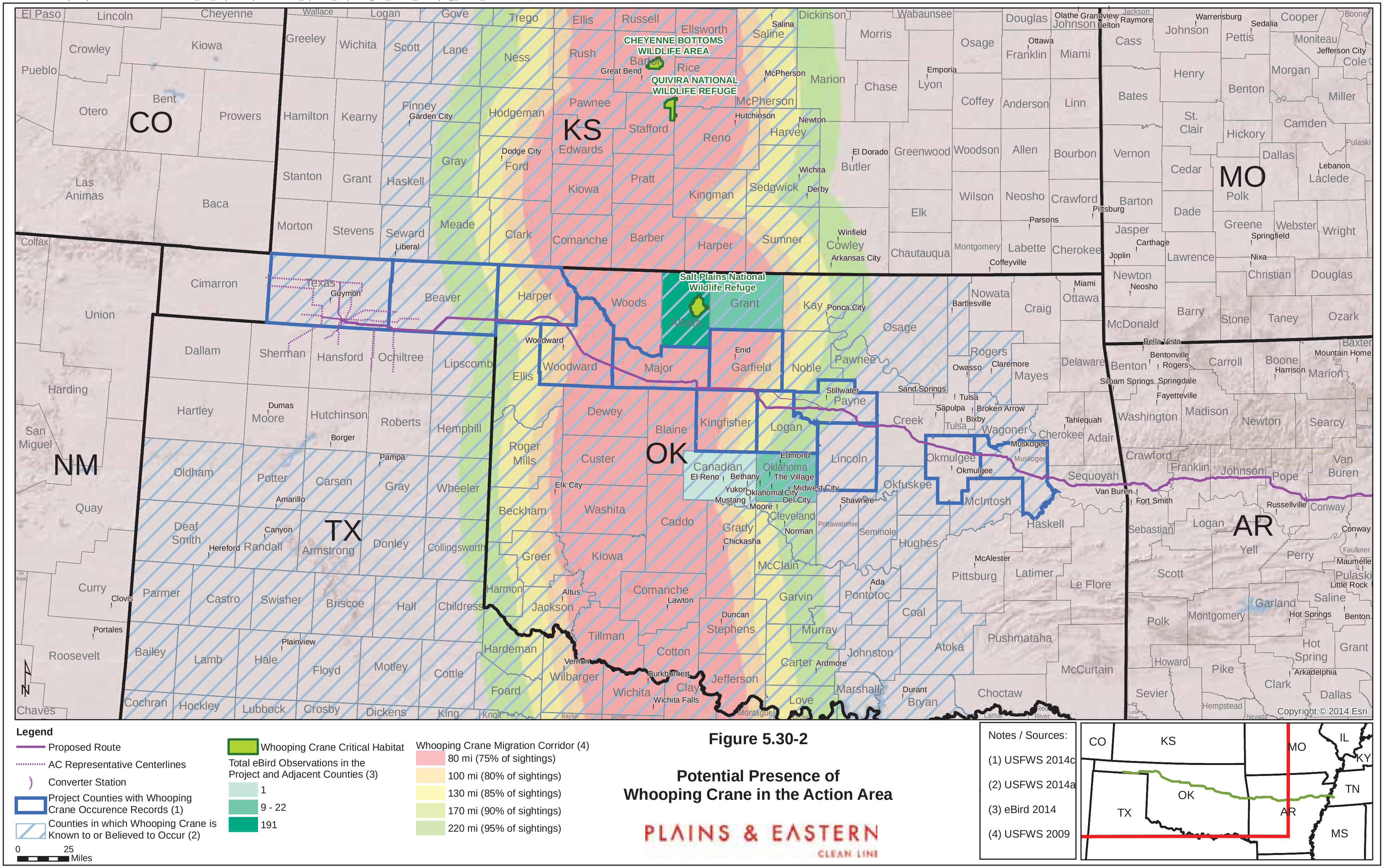

Figure 5.30-2

Potential Presence of Whooping Crane in the Action Area

PLAINS & EASTERN CLEAN LINE

Appendix B
Permit Table

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Plains and Eastern Clean Line Permit Table
March 2015

Issue	Action Requiring Permit, Approval, or Review	Agency	Permit, License, Compliance, or Review	Relevant Laws and Regulations
FEDERAL				
National Environmental Policy Act (NEPA) Compliance	2005 Energy Policy Act Section 1222 participation decision and implementation of participation	U.S. Department of Energy; Southwestern Power Administration	Environmental Impact Statement (EIS) and Record of Decision (ROD); Ongoing compliance with NEPA review obligations for agency decisions, as applicable	NEPA (42 USC 4321); CEQ (40 CFR 1500-1508); DOE NEPA implementing Regulations (10 CFR 1021)
ROW Across Land Under Federal Management	Preconstruction surveys; construction, operation, maintenance, and decommissioning	U.S. Forest Service (USFS)	Special Use authorization permit; Project-specific Forest Management Plan Amendment; lease or easement	36 CFR 251; 16 USC 518; 43 USC 1761-1771
	Preconstruction surveys; construction, operation, maintenance, and decommissioning on Tribal land	Bureau of Indian Affairs (BIA)	ROW Grant	25 CFR 169; 25 USC 323-328
	Right-of-way across USACE controlled real property	USACE	Realty Outgrant	Army Regulation 405-80; 32 CFR 643-644; 10 USC 2668-2668a
	Right-of-way crossing USACE-controlled levee	USACE	Section 408 Review and Determination	Rivers and Harbors Act of 1899 Section 14 (33 U.S.C. 408)
	Construction across water resources	USACE	General easement	10 USC 2668-2668a
Biological Resources	Potential impacts on federally protected species	USFWS NOAA (as applicable)	Endangered Species Act (ESA) consultation	Endangered Species Act of 1973 as amended (16 USC 1531 et seq)
	Potential impacts on migratory birds	USFWS	Compliance	Migratory Bird Treaty Act of 1918, 16 USC 703-712; 50 CFR 1
	Potential impacts on bald and golden eagles	USFWS	Compliance	Bald and Golden Eagle Protection Act of 1972 (16 USC 668)
Ground Disturbance and Water Quality Degradation	Discharge of dredge or fill material into waters of U.S.	USACE in coordination with states	Individual Permit or Nationwide Permit (Section 404); Water Quality Certification (Section 401)	Clean Water Act (33 USC 1344) (33 USC 1341)

Plains and Eastern Clean Line Permit Table March 2015				
Issue	**Action Requiring Permit, Approval, or Review**	**Agency**	**Permit, License, Compliance, or Review**	**Relevant Laws and Regulations**
	Construction of any structure in or over any navigable water of the US	USACE	Rivers and Harbors Act Section 10 permit	Rivers and Harbors Act of 1899 (33 USC 403)
	Construction in or modification of floodplains or wetlands	DOE	Compliance	42 USC 4321 Ex. Ord. Nos 11990 and 11988 Floodplains
	Impacts on rivers included in National Wild and Scenic Rivers Systems	NPS	Consultation	Wild and Scenic Rivers Act (PL 90-542) (16 USC 1271-1287)
	Discharge of pollutants into Waters of the United States from a point-source	EPA (Non-delegated)	Individual or General Permit (Section 402)	Clean Water Act (33 USC 1342)
Historical or Cultural Resources	Effects on historic properties	DOE, in consultation with State Historic Preservation Officers (SHPO), Advisory Council on Historic Preservation, affected Tribes, other Federal, state, and local agencies and consulting parties	NHPA Section 106 Consultation	National Historic Preservation Act of 1966, (16 USC 470) (36 CFR 800)
	Intentional removal from or excavation of Native American cultural items from Federal or tribal lands for purposes of discovery, study, or removal	DOE in consultation with affected Native American group(s) regarding treatment of remains and objects	Consultation	Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001-3002)
	Excavate, remove, damage, alter or deface archaeological resources on Federal or Tribal lands	Federal land management agency	Permit	Archaeological Resources Protection Act of 1979 (16 USC 470aa to 470ee) (43 CFR 7)
	Examine, excavate, or gather archaeological, historical or paleontological resources on Federal or Tribal lands	Federal land management agency	Permit	Antiquities Act of 1906 (16 USC 432-433)

Plains and Eastern Clean Line Permit Table March 2015				
Issue	**Action Requiring Permit, Approval, or Review**	**Agency**	**Permit, License, Compliance, or Review**	**Relevant Laws and Regulations**
Air Traffic	Structures greater than 200' tall	Federal Aviation Administration (FAA)	Review and "no-hazard determination"	FAA Act of 1958 (PL 85-726) (14 CFR 77)
	Structures in proximity to airport facilities and airspace	FAA	Section 1101 Air Space Permit	FAA Act of 1958 (PL 85-726) (14 CFR 77)
Agricultural Impacts	Impacts on agricultural lands, including prime, unique, and State and locally important farmland	Natural Resource Conservation Service (NRCS)	Farmland Site Assessment and Conversion Impact Ratings	Farmland Protection Policy Act (7 CFR 658; 7 USC 4201-4209)
STATE				
OKLAHOMA				
Electric Transmission Public Utility	The production, transmission, delivery or furnishing electric current for light, heat or power	Oklahoma Corporation Commission (OCC)	Certificate of Convenience and Necessity (issued October 28, 2011, by Order of OCC, Order #590530)	17 O.S. 151
Ground Disturbance and Water Quality Degradation	Discharge into waters of the state (including wetlands)	Oklahoma Department of Environmental Quality (ODEQ)	Section 402 National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges from Construction Activities	Clean Water Act (33 USC 1342)
	Construction activities resulting in greater than one acre of surface disturbance	ODEQ	OKR10 General Permit for Storm Water Discharges	Oklahoma Pollutant Discharge Elimination System Act (OPDES), 27A O.S. 2-6-201; 40 CFR 122.26 (b)(12)(x)
	Water use during construction	OWRB	Permit	Oklahoma Code, Waters and Water Rights; Chapter 82 O.S. 1020.1, et Seq.
Historical or Cultural Resources	Federal undertaking with the potential to affect historic properties	OK SHPO	Participation in NHPA Section 106 consultation (above)	National Historic Preservation Act of 1966, (16 USC 470) (36 CFR 800)
	Excavation and/or removal of archaeological resources	OK SHPO	Permit	Oklahoma Antiquities Law - Oklahoma Statute Chapter 20 (Section 361)

Plains and Eastern Clean Line Permit Table March 2015				
Issue	**Action Requiring Permit, Approval, or Review**	**Agency**	**Permit, License, Compliance, or Review**	**Relevant Laws and Regulations**
ARKANSAS				
Wildlife resources	Right-of-way across Wildlife Management Areas	Arkansas Game and Fish Commission (AGFC)	Easement or Special Use Permit	AR Code Ann. 15-20
Ground Disturbance and Water Quality Degradation	Non-point source discharges of storm water (delegated to state)	Arkansas Department of Environmental Quality (ADEQ)	Section 402 National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges from Construction Activities	AR Water and Air Pollution Control Act (AR Code Ann. 8-4-101 et seq)
Historic or Cultural Resources	Federal undertaking with the potential to affect historic properties	AR SHPO	Participation in NHPA Section 106 consultation (above)	National Historic Preservation Act of 1966, (16 USC 470) (36 CFR 800)
ROW Water Feature Crossings	Navigable Waters crossing by public service facility	Arkansas Public Service Commission	Navigable Waters Crossing petition	AR Code Ann. 23-3-500 et seq
TENNESSEE				
Utility Franchise	Develop, construct, own, operate, manage and control electric transmission facilities and operate as a public utility providing electric transmission service	Tennessee Regulatory Authority (TRA)	Certificate of Public Convenience and Necessity	TN Code Ann. 65-4-208 and 65-4-201
Historic or Cultural Resources	Federal undertaking with the potential to affect historic properties	Tennessee Historical Commission	Participation in NHPA Section 106 consultation (above)	National Historic Preservation Act of 1966, (16 USC 470) (36 CFR 800)
Ground Disturbance and Water Quality Degradation	Land-disturbance activities equal to or greater than 1 acre in size	TDEC – Division of Water Pollution Control	Section 402 National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges from Construction Activities	T.C.A. 69-3-108 and the Clean Water Act 33 U.S.C. 1251 et seq.
	Impacts on waters of the State	TDEC – Division of Water Pollution Control	Aquatic Resource Alteration Permit (ARAP)	T.C.A. 69-3-108; Section 401 and 404 of the Clean Water Act

Appendix C
Desktop Assessment of Habitat Suitability for the American Burying Beetle (*Nicrophorus americanus*) for Clean Line Energy Partners, LLC

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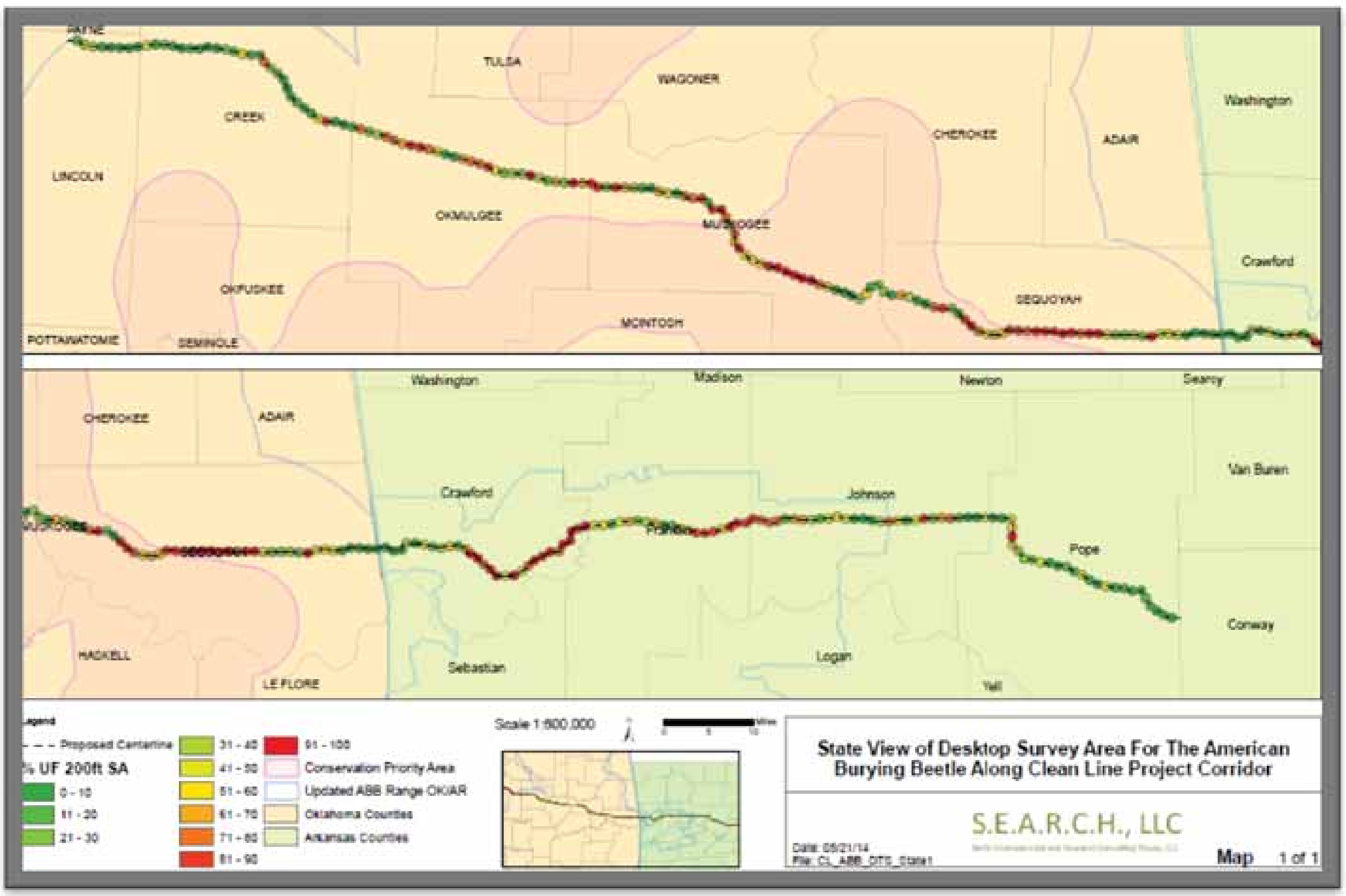
Desktop Assessment of Habitat Suitability for the American Burying Beetle (*Nicrophorus americanus*) for Clean Line Energy Partners, LLC

Draft; Pre-Decisional; Subject to Revision; Not for Public Distribution



Dr. Amy Smith of S.E.A.R.C.H., LLC.
in conjunction and under contract with
Ecology and Environment, Inc.
July 9, 2014
amysmith@searchconsultinghouse.com

Executive Summary


Photo by
Dr. Craig Clifford

Clean Line Energy Partners, LLC (Clean Line) has proposed to develop an overhead ± 600 kilovolt high-voltage direct current electrical transmission system that would have the ability to deliver approximately 3,500 megawatts from renewable energy facilities in the Oklahoma Panhandle to entities in the Mid-South and southeastern United States. The Applicant's proposed route traverses 209 miles within the known range of the endangered American burying beetle (ABB) within Oklahoma and Arkansas. Of these, 39 miles fall additionally within the conservation priority area of Oklahoma.

The endangered ABB spends much of its life cycle below ground. Soil disturbances in areas inhabited by ABB's could kill adults, eggs, larva, and pupa. This could impact the population's reproductive potential. The Project may alter suitable habitat, potentially reducing the availability of carcasses for feeding and reproduction by ABBs. The Project may increase fragmentation; potentially increasing competition with vertebrate scavengers for available carcasses.

A desktop survey was completed to assess the presence of suitable habitat along the Project's proposed route. The proposed route was buffered to delineate a 200 ft. corridor to accommodate potential direct and indirect impacts associated with a potential 200 ft.-wide right-of-way. Habitat within the corridor was classified as unfavorable for the ABB if it met the US Fish and Wildlife Service (USFWS) criteria for unsuitable habitat. The 200 ft. corridor included 5,058 acres of which 50.5% was unfavorable and therefore would not be considered potential habitat for ABBs. There were nine miles that had 100% unfavorable habitat, and therefore would not require surveys.

The corridor was expanded to 1,200 ft. to account for minor changes to the route and additional disturbance areas such as access roads and multi-use construction yards. The expanded 1,200 ft. corridor contained 30,325 acres of which 50.3% was classified as unfavorable. Accordingly, most portions of the proposed route are a mosaic of unfavorable habitats and those habitats that have some potential to support ABBs.

Projects that would disturb habitat within the ABB range (USFWS 2013a) may assume that ABBs are present in all favorable habitat that will be disturbed and mitigate accordingly. Alternatively, pre-construction presence/absence surveys can be used to identify occupied habitat, and the results can be used to refine compensatory mitigation. Generally, ABBs do not occupy all favorable habitat. Presence/absence surveys delineate the smaller subset of acres that are actually occupied by the ABB.

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Introduction

Clean Line Energy Partners, LLC (Clean Line) has proposed to develop an overhead ± 600 kilovolt high-voltage direct current electrical transmission system with associated facilities. The project would have the ability to deliver approximately 3,500 megawatts of electricity from renewable energy facilities in the Oklahoma Panhandle to entities in the Mid-South and southeastern United States by connecting with the Tennessee Valley Authority. Potentially 500 megawatts may be delivered to Midcontinent Independent System Operator in Arkansas (Draft Project Description).

The Project traverses 209 miles within the current range of the endangered American burying beetle, *Nicrophorus americanus* Olivier (Coleoptera, Silphidae), (further noted as ABB) in Oklahoma and Arkansas. Of these, 39 miles fall additionally within Oklahoma's ABB conservation priority area.

The ABB was placed on the Endangered Species List in 1989 after it declined to just 10% of its historic range. It is now found in nine states including Arkansas and Oklahoma. Projects that would disturb habitat within the ABB range (USFWS 2013a) may assume that ABBs are present and mitigate accordingly or complete presence/absence surveys. This report summarizes the biology of the ABB, describes the methods used to assess suitability of habitats for ABBs, and provides the results of the desktop analysis.

Biology of the American Burying Beetle

The ABB is the largest carrion beetle in North America. It historically ranged throughout 35 states and several Canadian provinces, but is now found in only nine states: Rhode Island, Massachusetts, Oklahoma, Arkansas, Kansas, Nebraska, South Dakota, Texas, and an experimental population in Missouri.

ABBs measure from 1 to 1 3/8 inches in length and have distinct orange markings on their shiny black elytra, pronotum, and frons. The orange mark on the pronotum is the distinguishing characteristic for ABB versus the other *Nicrophorus* species. The males and females can be distinguished by the triangular orange mark below the frons in females and the rectangular to trapezoidal orange mark in males. Adult ABBs overwinter in the soil. This nocturnal species typically emerges from the soil when nighttime temperatures exceed 60°F in the spring. Upon emergence, the adults will search for a carcass upon which to feed and/or for reproduction. ABBs are sensitive to desiccation and will seek suitable microclimates in soil and/or leaf litter during the day.

This species uses carrion for food. Appropriate sized carcasses are buried to reduce competition with scavengers and decomposers, and are used as a food source for the ABB's offspring. This genus of carrion beetle exhibits parental care of young, which is unusual in a non-social insect. Reproduction occurs between late April and mid-August, depending on latitude (USFWS 1991).

ABBs locate a suitable carrion item using sensitive chemoreceptors on the antennae, and once a carcass is secured, males will attract females with pheromones. Competition with other ABBs and *Nicrophorus* species occurs until one pair of beetles occupies the carcass. The carcass is typically buried during the first night, cleaned of fur or feathers, and coated with anal and oral secretions to inhibit decomposition (USFWS 1991). Eggs are laid in an escape tunnel near the carrion item. At least one parent, usually the female (Smiseth and Moore 2004), stays with the carcass throughout growth and development of the larvae which ranges from 21-60 days (Wilson and Fudge 1984; Wilson, Knollenberg, and Fudge 1984). During this time, parents provide food for larvae and defend them from predators and competitors (Eggert and Müller 1997; Eggert, Reinking, and Müller 1998; Scott 1998). *Nicrophorus* larvae are able to self-feed upon hatching but are provided with predigested carrion by the parents (Featherston, Scott, and Traniello 1990; Rauter and Moore 1999; Smiseth and Moore 2002; Smiseth, Darwell, and Moore 2003). Hatching of eggs is asynchronous, resulting in large size variation within broods as larvae increase in body mass rapidly within 24 hours after hatching (Smiseth, Darwell, and Moore 2003).

It is unclear why ABBs declined to only two widely separated populations at the time of listing, considering the other eight species of *Nicrophorus* have not shown a similar decline (USFWS 1991; Sikes and Raithel 2002). Sikes and Raithel (2002) proposed eight hypotheses for the causative agent of ABB decline including: pesticide use, artificial light, a pathogen, habitat loss, vegetative change, vertebrate competition, loss of suitable carrion, and competition with congeners. Of these, they concluded that the most likely explanations were competition, and loss of optimally sized carcasses.

ABBs use larger carcasses (3 to 7 ounces) than other *Nicrophorus* spp. (Kozol et al 1988; Koulianos and Schwarz 2000) for reproduction. It was hypothesized that ABBs must search over a larger area than smaller congeners, and subsequently use more energy (Lomolino et al. 1995). Carrion is a high-quality food resource that is spatially and temporally limited. Competition among *Nicrophorus* spp. for carcasses of the appropriate size is high (Smith and Clifford 2008a and 2008b). Intraspecific and interspecific competition further limits the availability of carcasses for reproduction.

Competition for appropriate sized carcasses for reproduction has likely increased since ABBs were historically abundant. The now extinct passenger pigeon (*Ectopistes migratorius*), which occurred in flocks numbering millions of individuals, had a historic distribution that overlapped that of ABBs, and may have been a key carrion source (Sikes and Raithel 2002). Remaining carrion sources such as small mammals have been shown to decrease as forests become denser due to fire suppression (see USFWS 2008). Lastly, increased fragmentation creates more edge habitats and more “highways” for scavengers that use edges and roads, and which compete with ABBs for limited carrion (USFWS 2008).

ABBs overwinter in the soil as adults and spend much of their life cycle below ground. Accordingly, soil disturbances in areas inhabited by ABB’s could kill adults, eggs, larvae, and pupa. Because ABBs live only one year, this could impact the population’s reproductive potential, or even cause local extirpation. Construction disturbance could alter suitable habitat, potentially reducing the availability of carcasses for feeding and reproduction by ABBs. Clearing of the right-of-way may result in increased fragmentation, potentially increasing competition with vertebrate scavengers for available carcasses.

Project Area Description

The Project crosses eight counties within the ABB range in Oklahoma and Arkansas (Figure 1) which include six different ecotypes, including: Northern Cross Timbers, Osage Cuestas, Arkansas Valley Plains, Arkansas River Floodplain, Lower Boston Mountains, and Arkansas Valley Hills.

Precipitation is variable across the area, ranging from 36-52 inches of annual total precipitation. The majority of rainfall occurs in April through October. The number of frost free days is also variable (180-230) across the ecoregions (Woods et al. 2004; Woods et al. 2005).

The western portion of the Project (Oklahoma counties of Lincoln, Creek, Okmulgee, Muskogee, and Sequoyah) comprises a mosaic of ecotypes including the Northern Cross Timbers, Osage Cuestas, Arkansas Valley Plains, and Arkansas River Floodplain (Woods et al. 2005). The eastern portion of the area (Arkansas Counties of Crawford, Franklin, and Johnson) includes the mostly forested Lower Boston Mountains and Arkansas Valley Hills (Woods et al. 2004). Native vegetation across the range includes the cross timbers of oak-bluestem, tall grass prairie, oak-hickory-pine woodland, pastureland, rangeland, and cropland (Woods et al. 2005). Moving east into Arkansas the vegetation is oak-hickory-pine with extensive pastureland in less rugged areas (Woods et al. 2004).

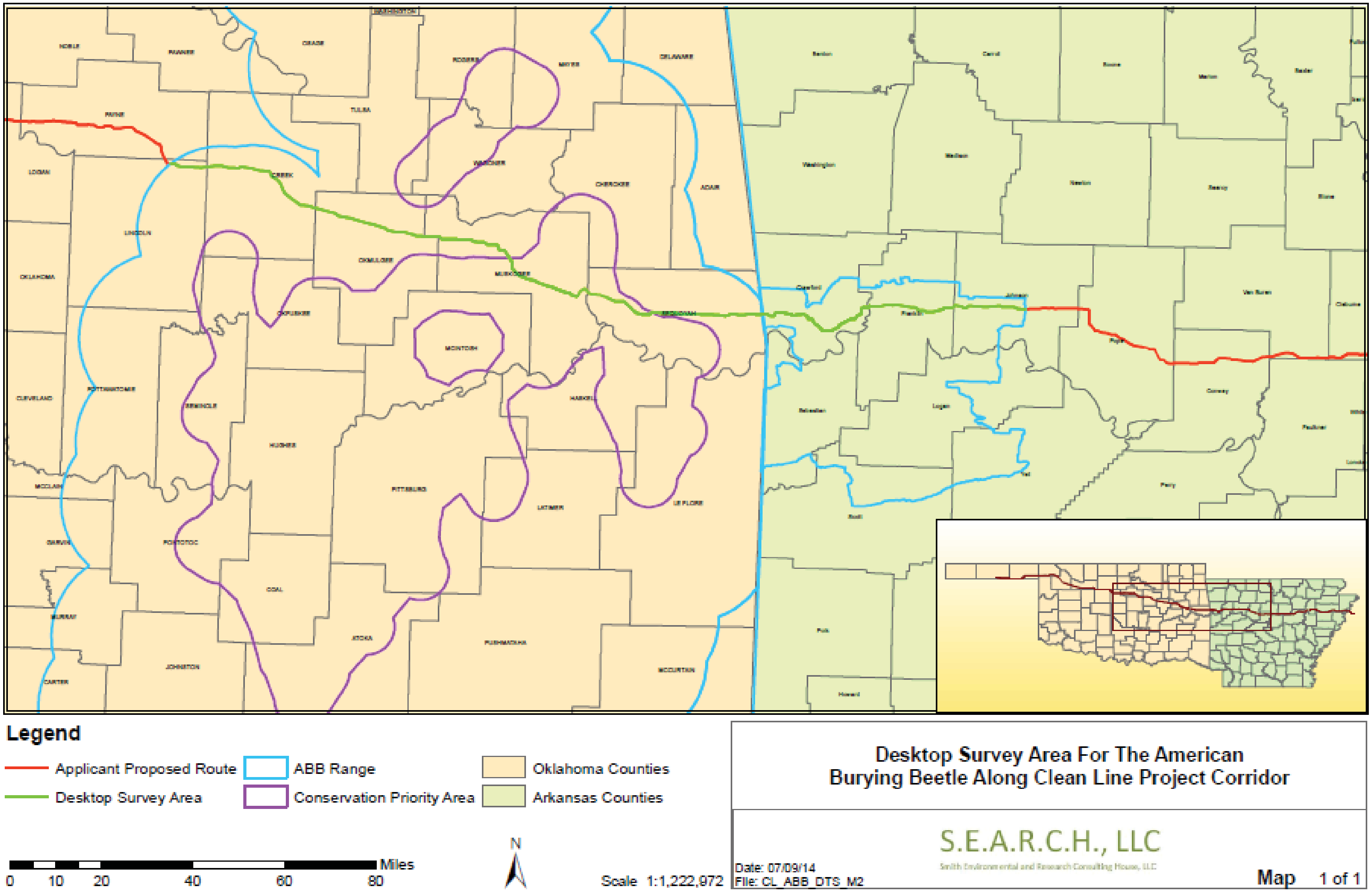

Figure 1. The applicant proposed route traverses 209 miles (desktop survey area in green) across the ABB range in Oklahoma and Arkansas.

ABB Habitat Description and Range

Determining the number of ABBs that could be affected during the Project is not possible. Population estimates of ABBs are problematic because populations vary temporally and spatially. ABBs travel widely and retreat underground to seek refuge from desiccation during the day, to reproduce, and to overwinter. This makes them unlikely to be captured from one trapping period to the next; violating the assumptions used to estimate populations with standard mark and recapture methods. Additionally, ABBs are an annual species. Because they live only one year, each year's population size is dependent upon the reproductive success of the previous year. Populations may be cyclic even when land use is relatively stable. Given their life cycle, it is unlikely that ABBs killed or injured would be observed because they would be crushed or buried under soils. Where estimating take of individuals is impracticable, the USFWS has agreed to use acres of habitat impacted as a proxy for take.

The ABB is considered a habitat generalist because it can be lured into a variety of native vegetative habitats during survey efforts. ABBs are mobile and individual beetles have been documented to move between habitats and to travel and average of 0.7 mi per night. Given the known distributions of ABBs in varied ecoregions of Nebraska, Arkansas/Oklahoma, and Rhode Island, it is apparent that ABBs do not have specific habitat requirements that are consistent across its entire range.

While no critical habitat has been established by the USFWS, the USFWS has identified a consultant range in Oklahoma and Arkansas. These states fall within different USFWS regions and are under different administrations. The regions have different methods for addressing ABBs within Oklahoma and Arkansas. These differences are summarized below for each state.

Oklahoma

Within Oklahoma (USFWS Region 2) the ABB range includes all areas within 18.6 miles of all documented ABB occurrences. Within that range are conservation priority areas, which are thought to contribute more towards ABB recovery than other areas (Figure 1). These classifications are tied to mitigation rates. Project impacts within the conservation priority area are mitigated at a higher rate than those that lie only within the consultant range.

ABBs are not found in all locations within the range. USFWS Region 2 considers areas with the following characteristic to be unfavorable for use by ABBs based on disturbance regime, vegetation structure, unsuitable soil conditions, and carrion availability (USFWS 2014b). For the purposes of this report, all other habitats are treated as having some potential to support ABBs and are described as "favorable".

1. Land that is tilled on a regular basis, planted in monoculture, and does not contain native vegetation.
2. Pasture or grassland that have been maintained through frequent mowing, grazing, or herbicide application at a height of 20 cm (8 inches or less.
3. Land that has already been developed and no longer exhibits surficial topsoil, leaf litter, or vegetation.
4. Urban areas with maintained lawns, paved surfaces, or roadways.
5. Stockpiled soil without vegetation.
6. Wetlands with standing water or saturated soils (defined as sites exhibiting hydric-soils, and vegetation typical of saturated soils, and/or wetland hydrology).

Arkansas
In Arkansas (USFWS Region 4) the ABB range includes the counties of Crawford, Franklin, Johnson, Little River, Logan, Scott, Sebastian, and Yell (Figure 1). The range is not broken into conservation priority areas. Soil disturbances of three acres or less do not require presence/absence surveys.

Desktop Assessment Methods

Estimating the take of individual ABBs is impractical. The USFWS has agreed to use acres of occupied ABB habitat impacted as a proxy for take. Keystone Gulf Coast serves as a precedent for this approach in Oklahoma.

A desktop assessment was completed to determine the percentage and location of habitat favorable for the ABB along the proposed route (200ft wide corridor). To assess any minor changes in the route or additional project disturbances such as access roads or multi-use construction yards. The analysis was also completed on an expanded corridor that consisted of an additional 500ft wide buffer (1,200 ft. total corridor) on either side of the potential right of way. ArcGIS 10.2 was used to develop a model to identify unfavorable habitat within the ABB range of Oklahoma and Arkansas. In the model, land cover classifications were characterized as unfavorable if they met any of the USFWS criteria identified previously. For the purpose of this report, all other habitat types were considered to be potential ABB habitat and are described as favorable.

The predictive value of the model was evaluated by using ArcGIS 10.2 "Create Random Points" http://help.arcgis.com/en/arcgisdesktop/10.0/hellp/indexhtml#//00170000002r000000 in the Data Management section to randomly select 100 points along the proposed route within the ABB range. Each of the 100 points was then compared against high resolution aerial images of the land cover provided by ESRI Basemaps updated May 2014 http://www.arcgis.com/home/item.html?id=10df2279f9684e4a9f6a7f08febac2a9.

Additionally, 30 points along the proposed route were randomly selected using ArcGIS 10.2 to be ground truthed during a windshield tour. The 30 points were limited to locations where the proposed route adjoined an existing primary or secondary road. At each of the 30 points, the habitat perpendicular to the roadway at a distance of 50 meters from the roadway was evaluated and classified as either "favorable" or "unfavorable" for ABBs. This was repeated for both sides of the road. The habitat 50 meters from the roadway was evaluated to account for the 30 meter pixel size of the USGS National Land Cover Database 2006. This helped insure that habitat outside of roadways was evaluated. Photos were taken at each of the 30 windshield tour sites for reference.

A greater area (249 miles) was used for the desktop assessment than was necessary. The original data used for the ABB range in Arkansas included the eastern half of Johnson County and all of Pope County. Erin Leone of the USFWS (5/28/2014) confirmed that the ABB range in Arkansas is smaller; ending in Johnson County. Rather than re-analyze the desktop survey, the results of the full analysis of 249 miles is included.

To determine the potential need for ABB surveys, the proposed route (200 ft. corridor) was divided into one mile sections. Each ABB survey unit (i.e., a single trap) has a functional trapping radius of ½ mile. Therefore a mile section of the proposed route would be assessed by placing a single trap in the center of the section. The percentage of unfavorable habitat was determined for each mile section, representing the trapping area of a survey unit, and color coded.

The model was updated to include areas with permissible landowner access. State land was assumed to be accessible. To evaluate accessibility, the proposed location of each survey unit was buffered by 250 feet. Landcover that was favorable for ABBs with permissible landowner access was identified.

The following resources were used to develop the model:

- USGS National Hydrology Dataset – http://nhd.usgs.gov/
- Census TIGER 2013 / Line Shapefiles – http://www.census.gov/geo/maps-data/data/tiger-line.html
- USFWS Wetlands Inventory Data – http://www.fws.gov/wetlands/Data/Index.html
- USGS National Land Cover Database 2006 – http://www.mrlc.gov/nlcd2006.php
- Proposed Route (Center line) provided by Clean Line
- Landowner permissible areas provided by Clean Line
- ABB Ranges provided by USFWS

Results of the Desktop Assessment

The proposed route travels through 209 miles of ABB range in Oklahoma and Arkansas. Within a 200 ft. wide route corridor there are 5,058 acres of which 50.5% would be unfavorable for ABBs. The expanded corridor of 1,200 ft. contains 30,325 acres of which 50.3% would be unfavorable. Most portions of the proposed route are a mosaic of favorable and unfavorable habitats. As a result, most portions have some percentage of favorable habitat (Figure 2).

Expanded views of these results can be found in the series of maps in Appendix A. There are nine miles that are 100% unfavorable, and therefore would not require surveys.

A total of 209 survey units would be necessary to survey the entire proposed route within the ABB range of Oklahoma and Arkansas. However, based on the model, nine miles do not contain any favorable ABB habitat (100% unfavorable) and would negate the need to survey those locations. Of the 200 survey units (209 -9 that are 100% unfavorable) 39 miles fall additionally within the conservation priority area of Oklahoma (Figure 2).

The overall model accuracy was 91% based upon the 100 randomly selected points examined using aerial imagery. While the model was inaccurate 9% of the time, the model was biased conservatively in favor of the ABB. The model identified habitat as being favorable 7% of the time, when aerial imagery indicated it was unfavorable.

The model accuracy based upon the ground truthed points was 89.6% (Figure 3). This method of evaluation indicated that the model was inaccurate 10.4% of the time. Approximately 4.5% of the time the model was biased conservatively in favor of the ABB. The model identified habitat as being favorable 4.5% of the time, when my ground truthing efforts judged them to be unfavorable. Photos documenting the windshield survey points can be found in Appendix B.

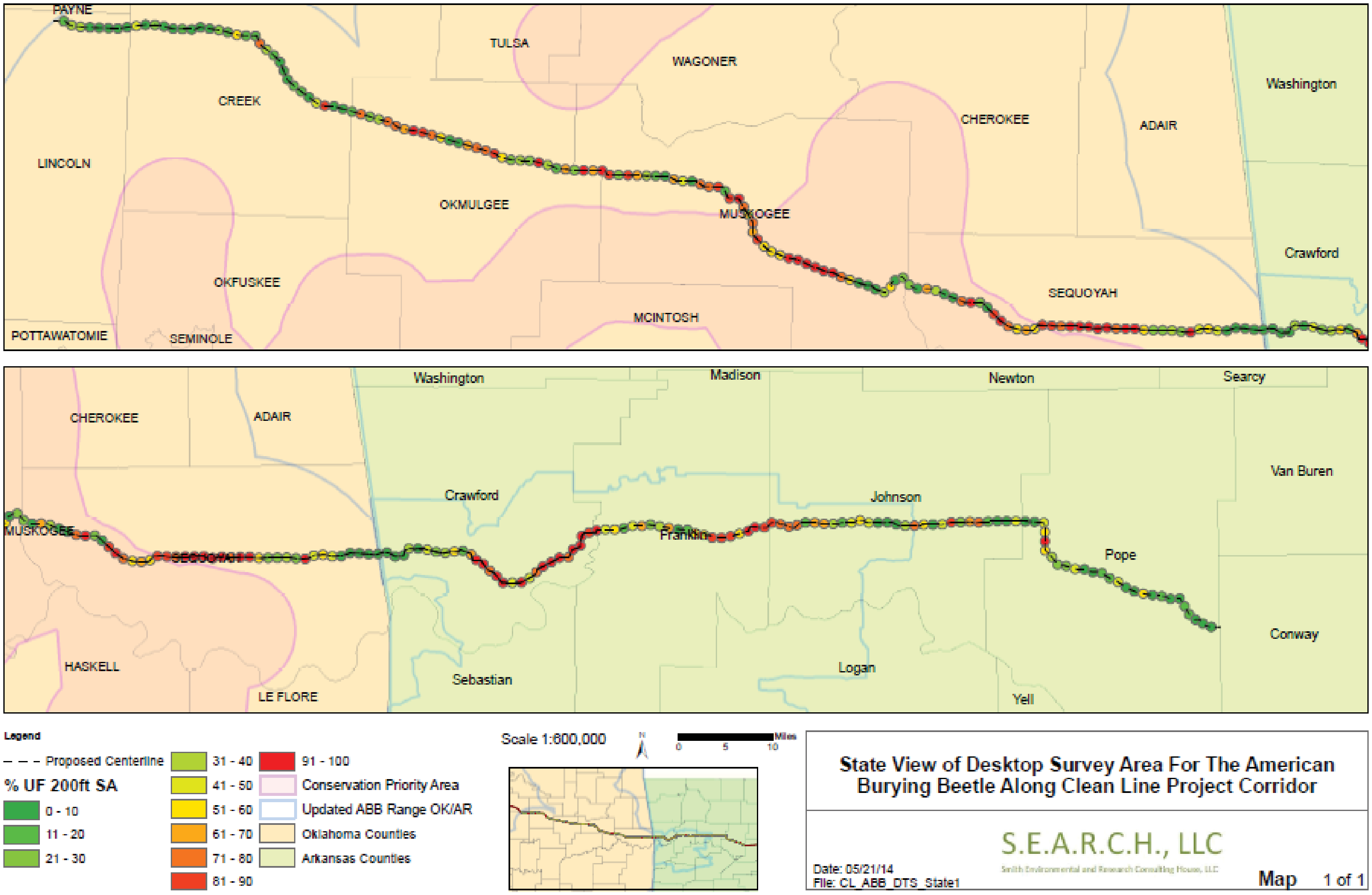

Figure 2. The proposed route (Proposed Centerline) was buffered to form a 200 ft. wide corridor. This was divided into one mile lengths. The percentage of unfavorable habitat was determined and color coded for each length. Most areas have some favorable ABB habitat.

100 Random Pts		Model Favorable	Model Unvaforable
		47	**53**
Evaluation	F	40	2
	UF	7	51

Of 100 random points evaluated by aerial imagery, overall model accuracy was 91%.

Road Random Pts		Model Favorable	Model Unvaforable
		28	**30**
Evaluation	F	25	4
	UF	3	26

Of 58 ground truth points evaluated, overall model accuracy was 89.6%

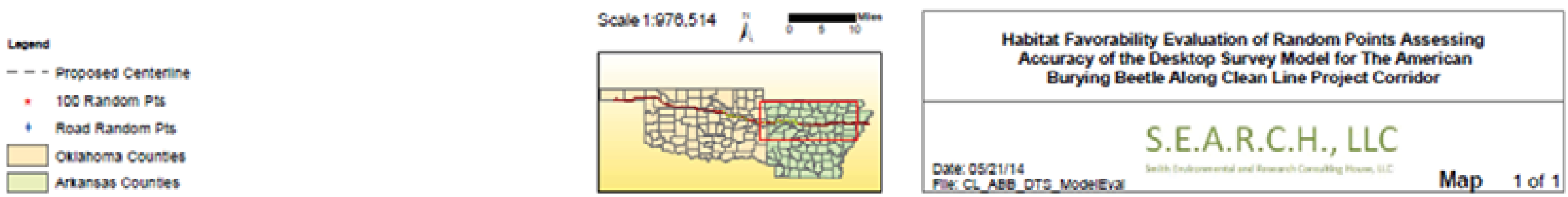

Figure 3. The model has an overall accuracy of 89.6%-91%. The results of both model assessments are shown. Note that the model was based on an expanded range of 247 miles as noted in the methods section. F=favorable habitat, UF=unfavorable habitat.

Discussion

The percentage of favorable habitat for ABBs along the proposed route varies. While the model indicates nine miles are 100% unfavorable, most one mile sections of the proposed route contain some favorable habitat.

Projects that would disturb habitat within the ABB range (USFWS 2013a) may assume that ABBs are present in all favorable habitat that will be disturbed and mitigate accordingly. Generally, ABBs do not occupy all favorable habitat. The smaller subset of acres that are actually occupied by the ABB can be assessed pre-construction and the results can be used to refine compensatory mitigation. This may be accomplished by reviewing the results of presence/absence surveys in the USFWS database for the appropriate active season, or completing presence/absence surveys. Presence/absence surveys can be completed only by permitted individuals during the ABB active period.

The presence/absence survey protocols for Oklahoma have experienced a period of flux with many changes in the last few years. Region 4 (Arkansas) has not followed suit. As a result, the two states have different presence/absence survey requirements and protocols.

Oklahoma

As of 2014 (USFWS 2014b) the active season in Oklahoma begins once there have been five consecutive nights with temperatures of 60° Fahrenheit or greater. In 2014 this was achieved in early May. The active season ends after the first night after August 31 when temperatures drop below 60° Fahrenheit. Presence/absence surveys are valid only until the next active period. For example, a presence/absence survey completed in 2014 would be valid until the active season begins in 2015 (USFWS 2014b). While it is unlikely that other presence/absence surveys would have been completed within 0.5 mile of the proposed route in the appropriate season, pursuing this option is less expensive than completing presence/absence surveys.

Within Oklahoma, areas with ABBs may be avoided, minimized, or mitigated. Best management practices for the ABB in Oklahoma are summarized here for convenience:

1. Decrease habitat loss by minimizing the clearing of temporary work areas and use small equipment or hand cutting techniques that leave the root zone intact.
2. Minimize construction requiring artificial lighting. Shield direct light to the work area.
3. Return surface soils to approximate pre-construction conditions
4. Restore areas in native range using approved native seed mixes for the appropriate ecotone.
5. Rip the impacted area prior to replacing topsoil.
6. Educate all workers operating in the project areas about ABB habitat, biology, reasons for ABB decline, and the responsibility of all workers to protect the ABB.

7. Install appropriate erosion controls.
8. Implement pollution prevention requirements. Including, fuel all equipment outside of ABB habitat and store all fuel and motor vehicle oil outside of ABB habitat.

Areas within Oklahoma where ABBs were absent would not require further action until the next active season. Areas where ABBs were found would be evaluated to estimate the acreage impacted, the impact duration (temporary, permanent cover change, permanent) and if the area was within the consultant range or the conservation priority area as these factors determine mitigation ratios (USFWS 2014).

Arkansas

Arkansas has elected to continue to use the "American burying beetle *Nicrophorus americanus* rangewide presence/absence live-trapping survey guidance updated 4/30/2013" (USFWS 2013b). The survey guidance indicates that the active season begins on May 20 and remains open until September 20. A presence/absence survey completed in 2014 would be valid until the active season begins May 20, 2015.

Best management practices for the ABB in Arkansas were not available at the time this document was developed. They are presumed to be similar to those used in Oklahoma.

Conclusions

The proposed route traverses 209 miles within the ABB consulting range of Oklahoma and Arkansas. Of these, 39 miles fall additionally within the conservation priority area of Oklahoma. Based on the desktop analysis as much as 50.5% of the habitat is unfavorable for ABBs within the proposed route (200ft wide corridor). Within an expanded corridor of 1,200ft as much as 50.3% of the area is unfavorable habitat. Despite these values, most portions of the proposed route are a mosaic of favorable and unfavorable habitats. As a result, most portions have some percentage of favorable habitat. Only nine miles contain no favorable habitat (100% unfavorable) and would not require surveys.

Projects that would disturb habitat within the ABB range (USFWS 2013a) may assume that ABBs are present in all favorable habitat that will be disturbed and mitigate accordingly. Alternatively, pre-construction presence/absence surveys can be used to identify occupied habitat, and the results can be used to refine compensatory mitigation. Generally, ABBs do not occupy all favorable habitat. Presence/absence surveys delineate the smaller subset of acres that are actually occupied by the ABB.

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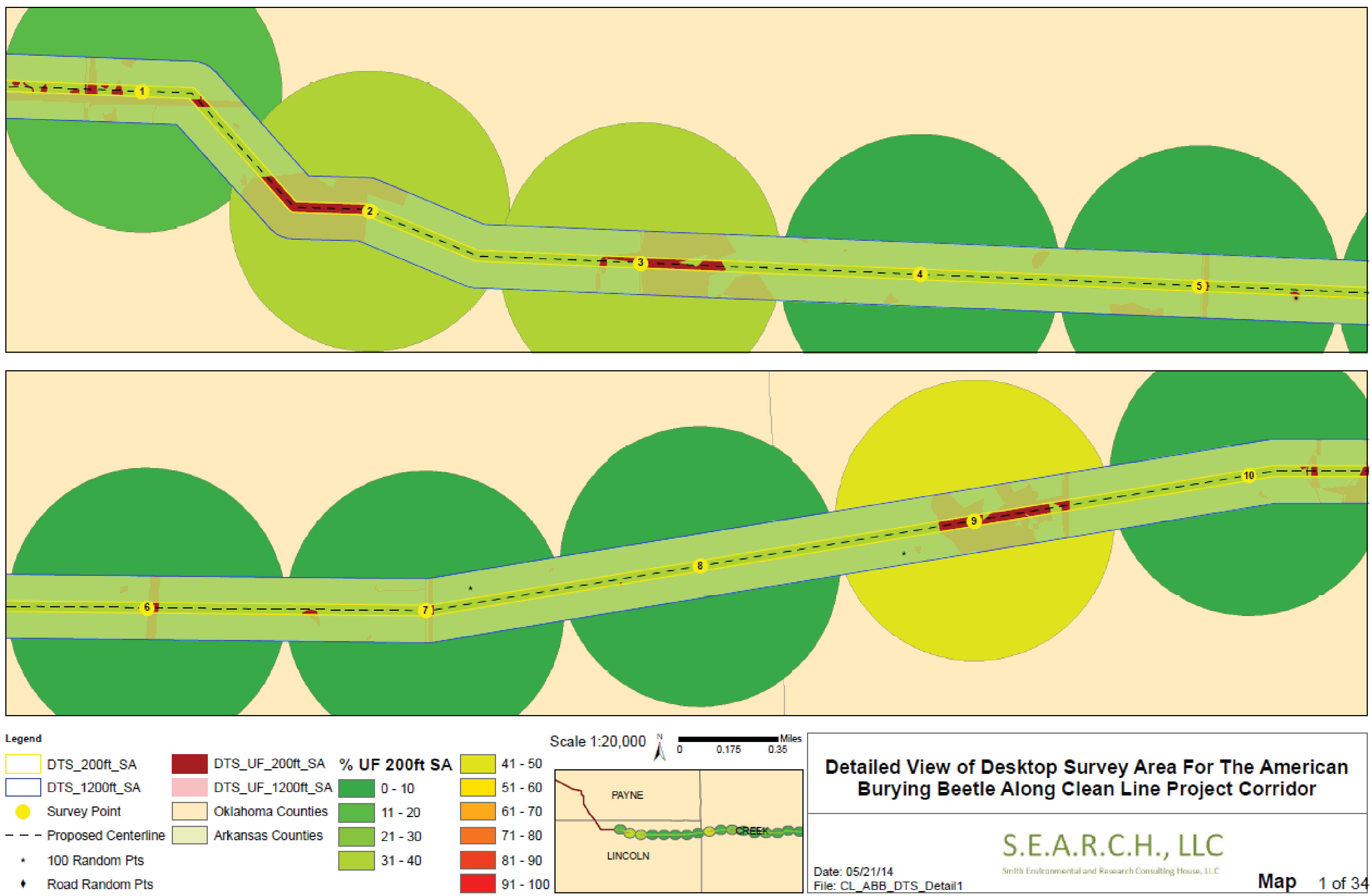
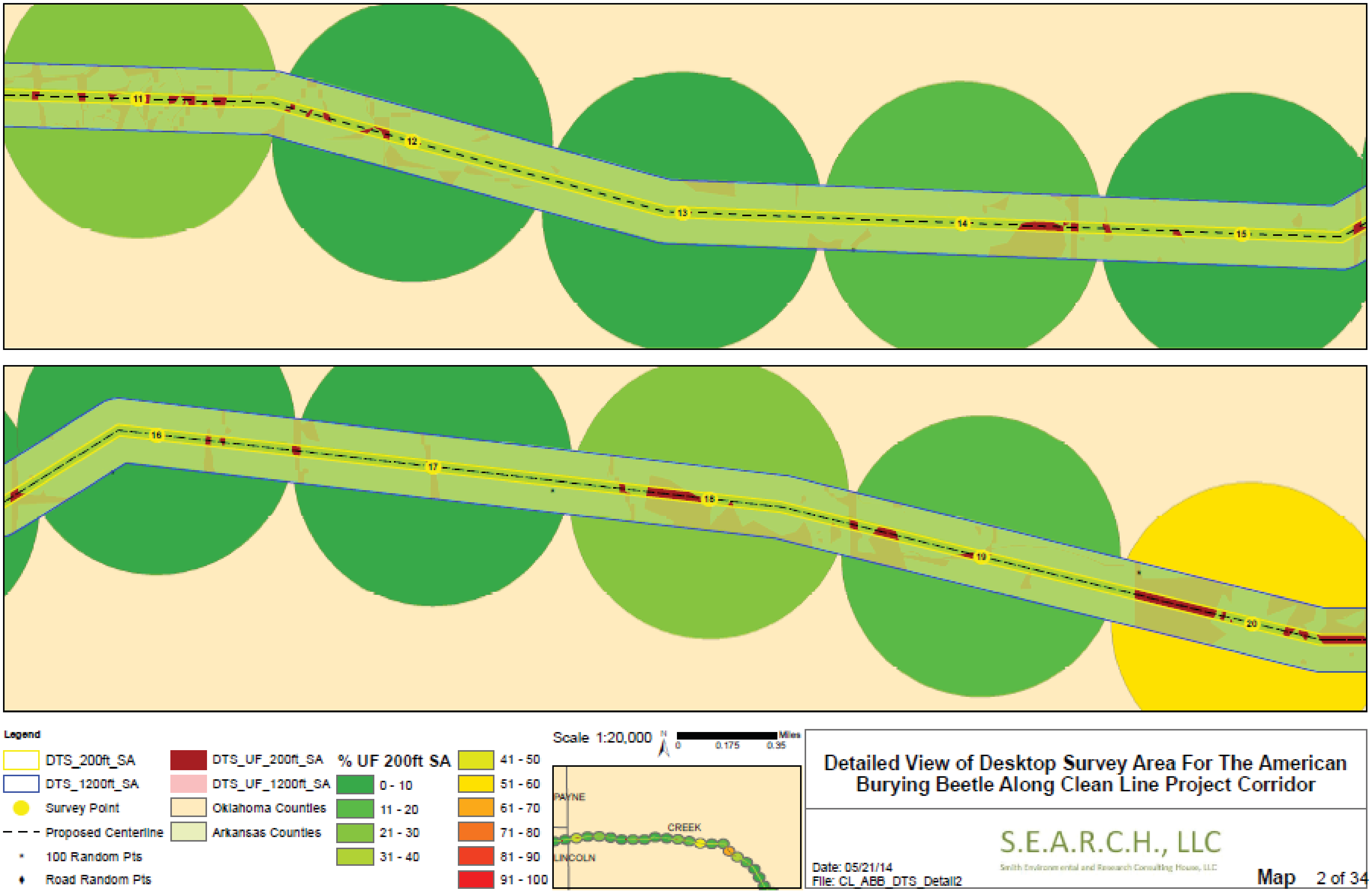
APPENDIX A

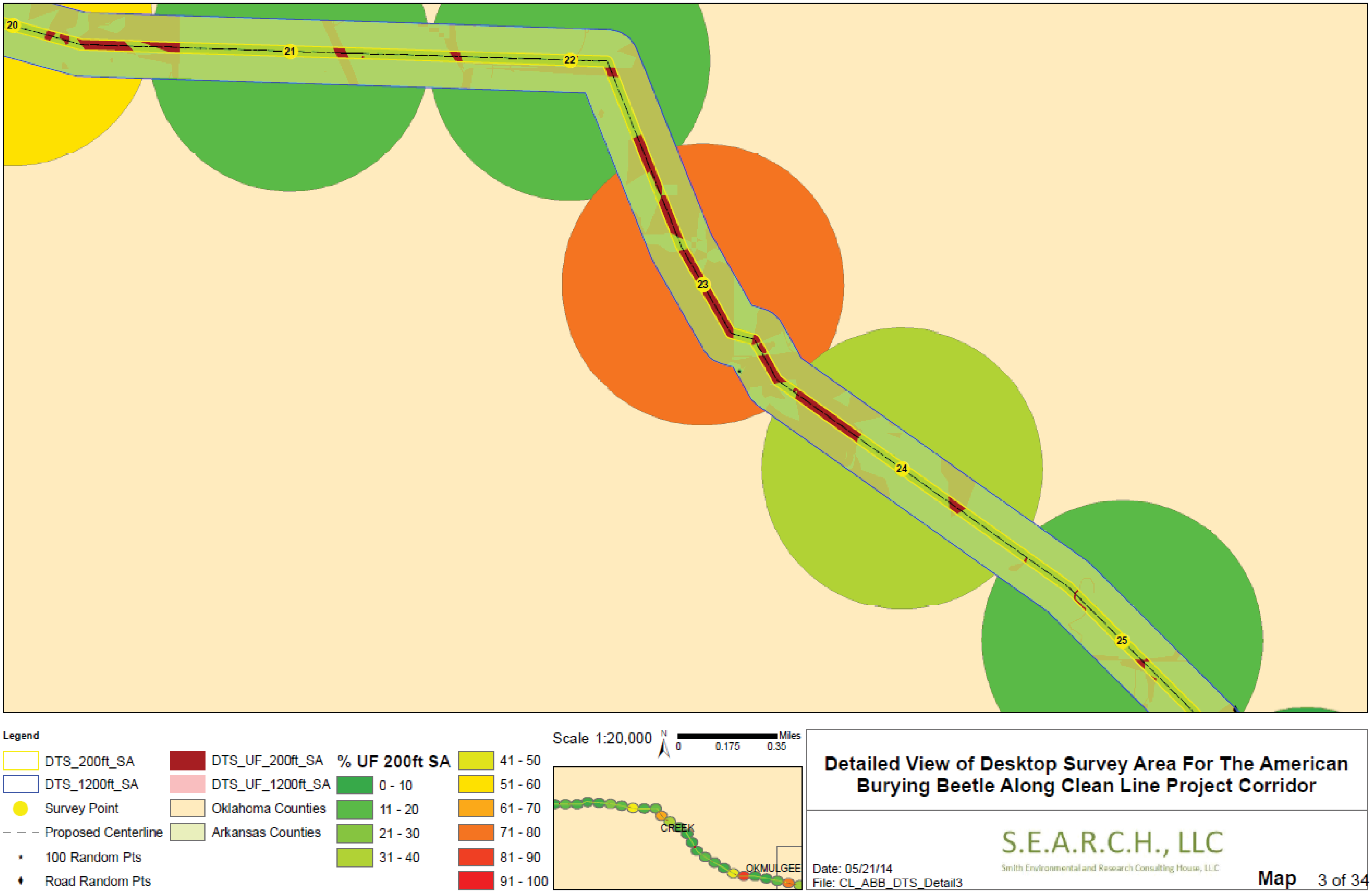
Habitat Suitability for the American Burying Beetle



Pre-Decisional; Subject to Revision; Not for Public Distribution

Habitat Suitability for the American Burying Beetle





Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor

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Smith Environmental and Research Consulting House, LLC

Date: 05/21/14

File: CL_ABB_DTS_Detail3

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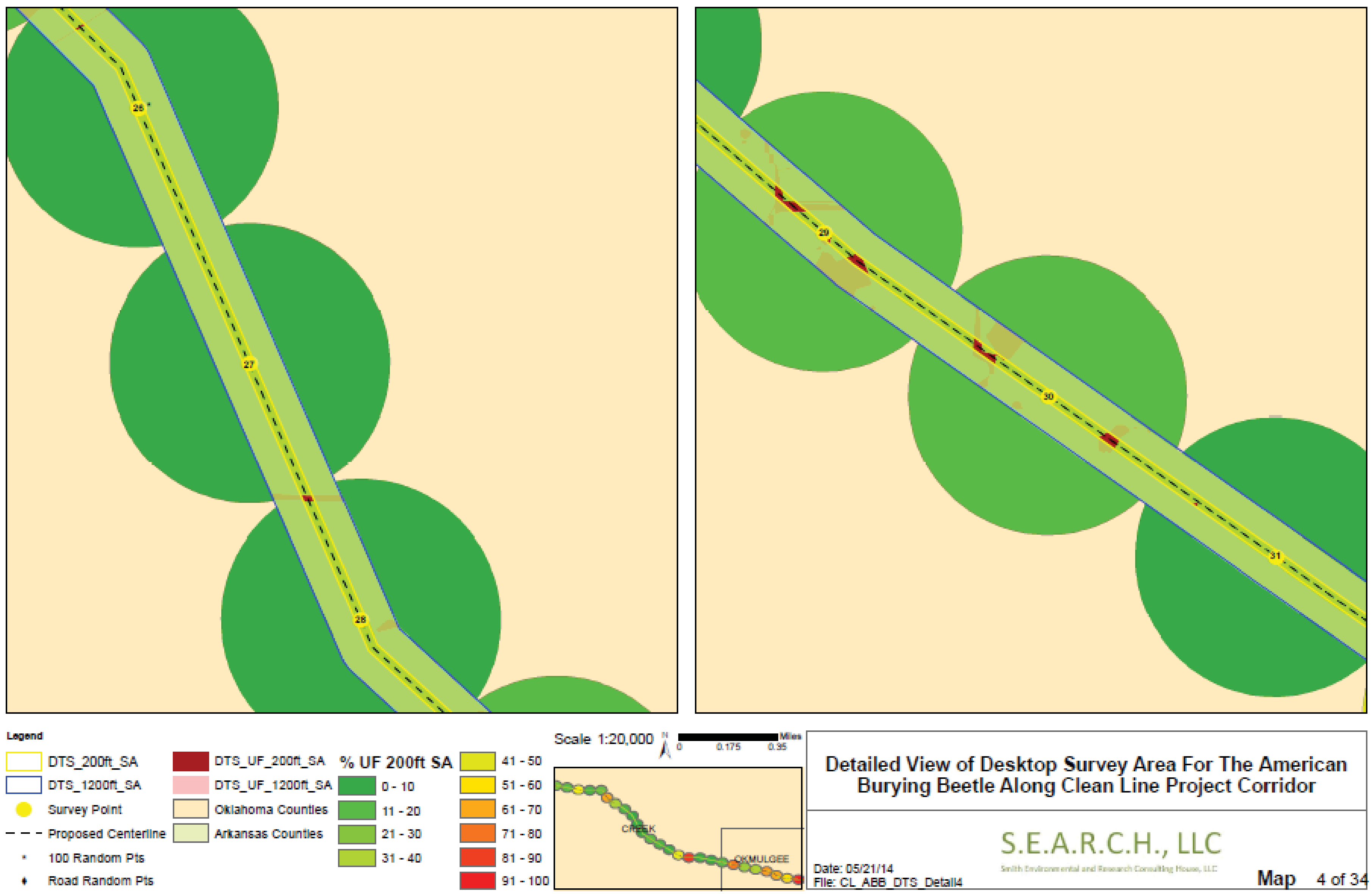
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Survey Point
Proposed Centerline
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DTS_UF_200ft_SA
DTS_UF_1200ft_SA
Oklahoma Counties
Arkansas Counties
% UF 200ft SA
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81 - 90
91 - 100
Scale 1:20,000
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CREEK
OKMULGEE
Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor
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Date: 05/21/14
File: CL_ABB_DTS_Detail4
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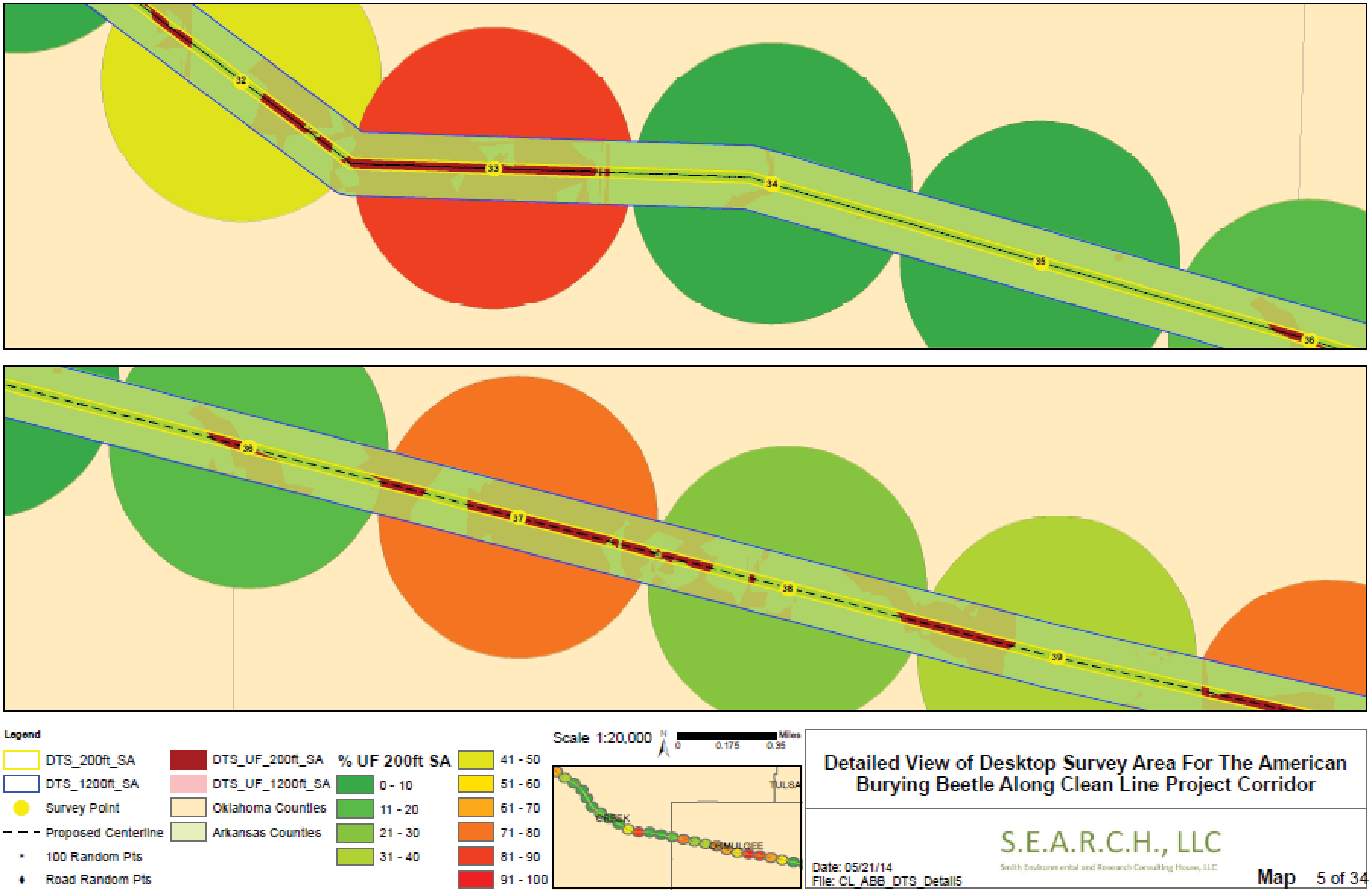
Habitat Suitability for the American Burying Beetle



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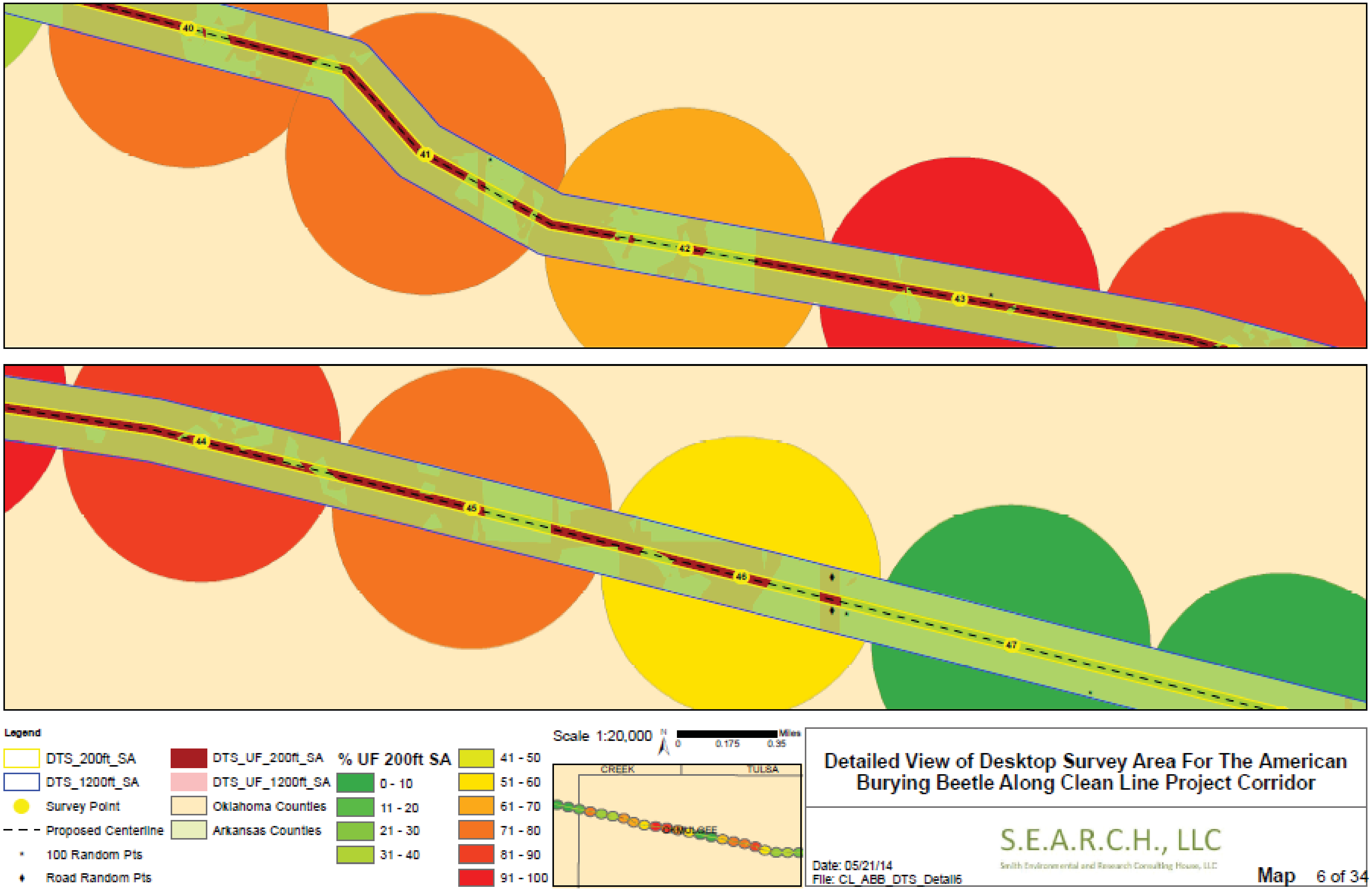
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Oklahoma Counties
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Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor
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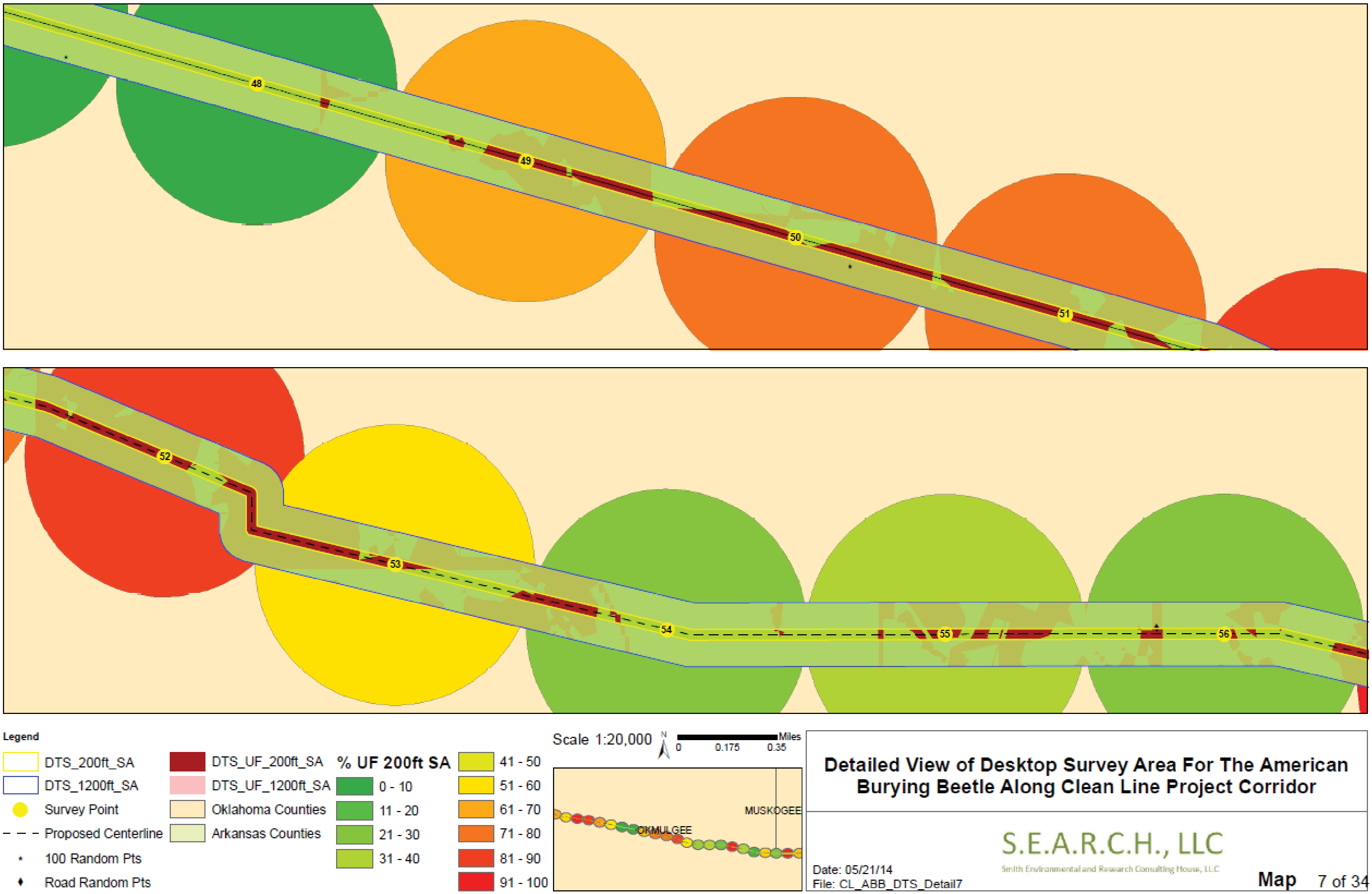
Habitat Suitability for the American Burying Beetle



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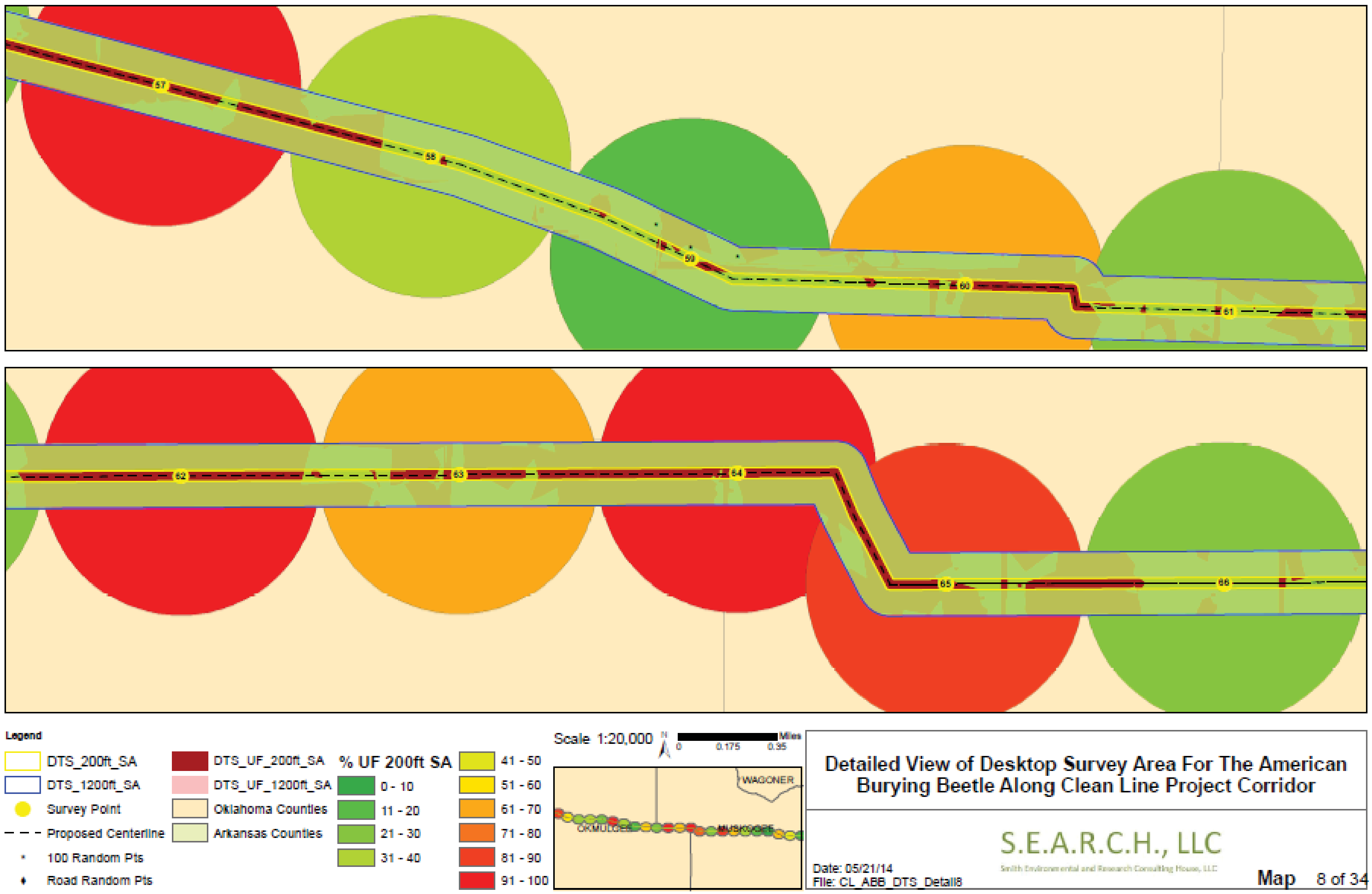

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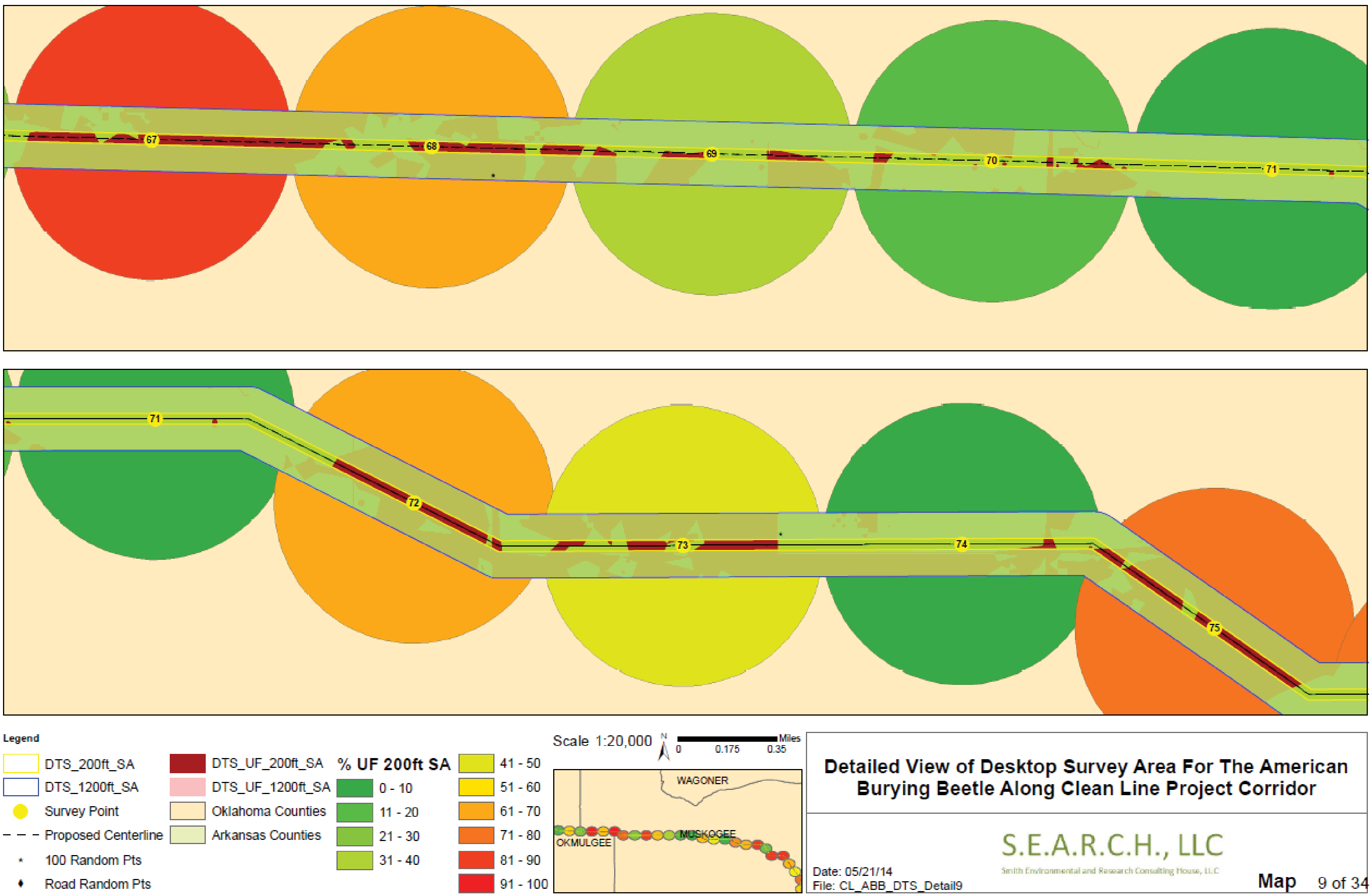

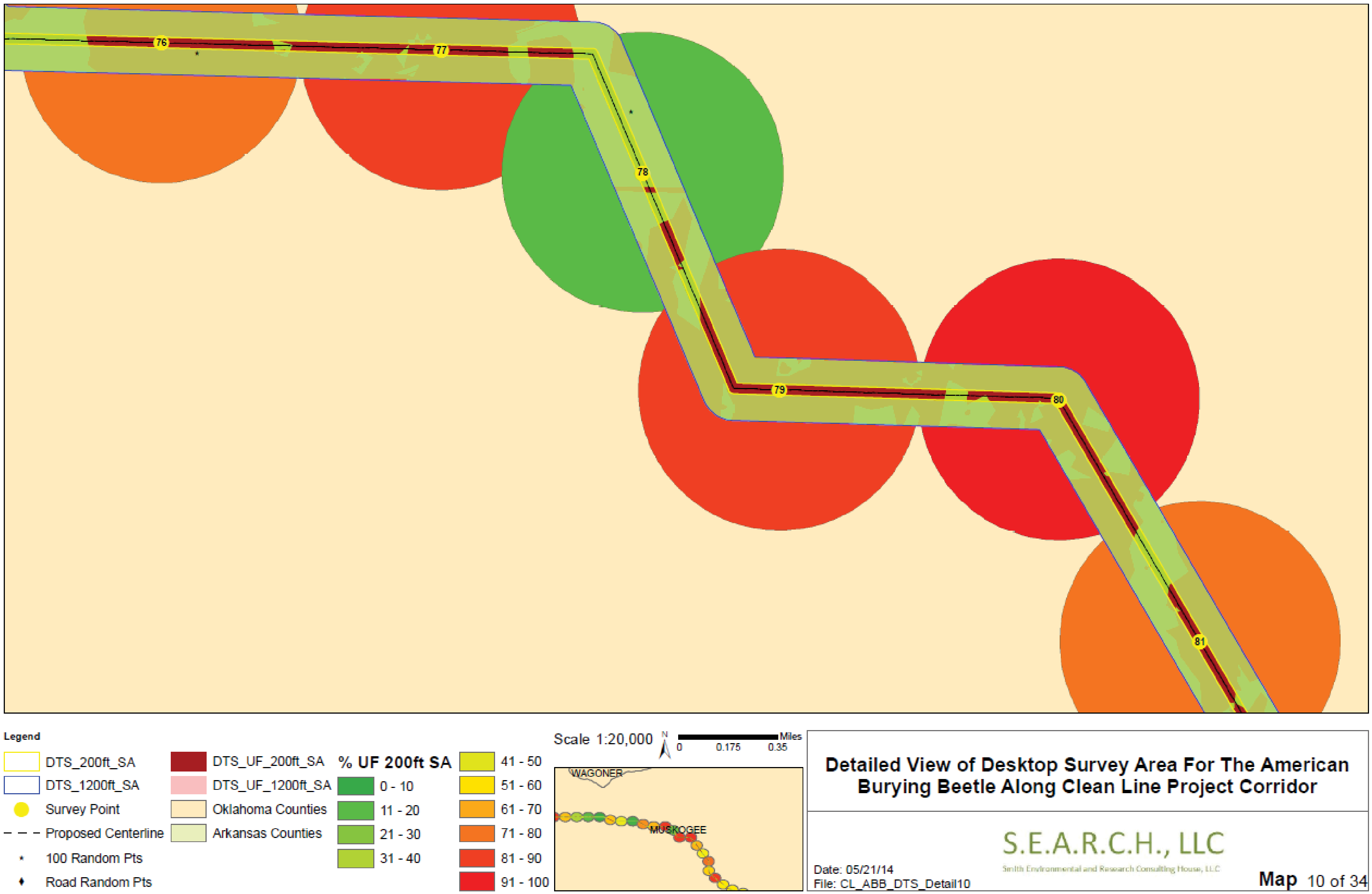
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Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor
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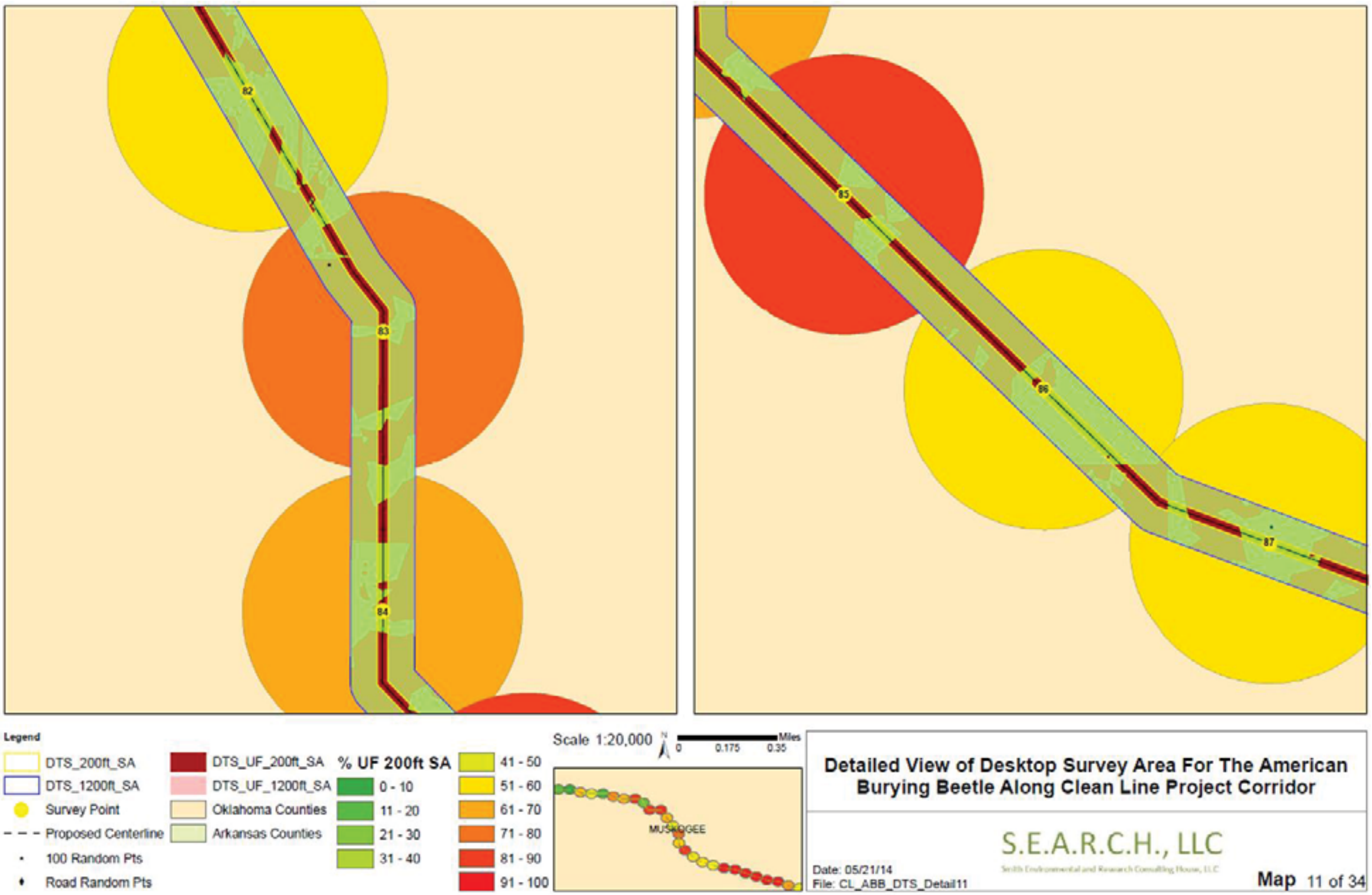
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Oklahoma Counties
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Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor
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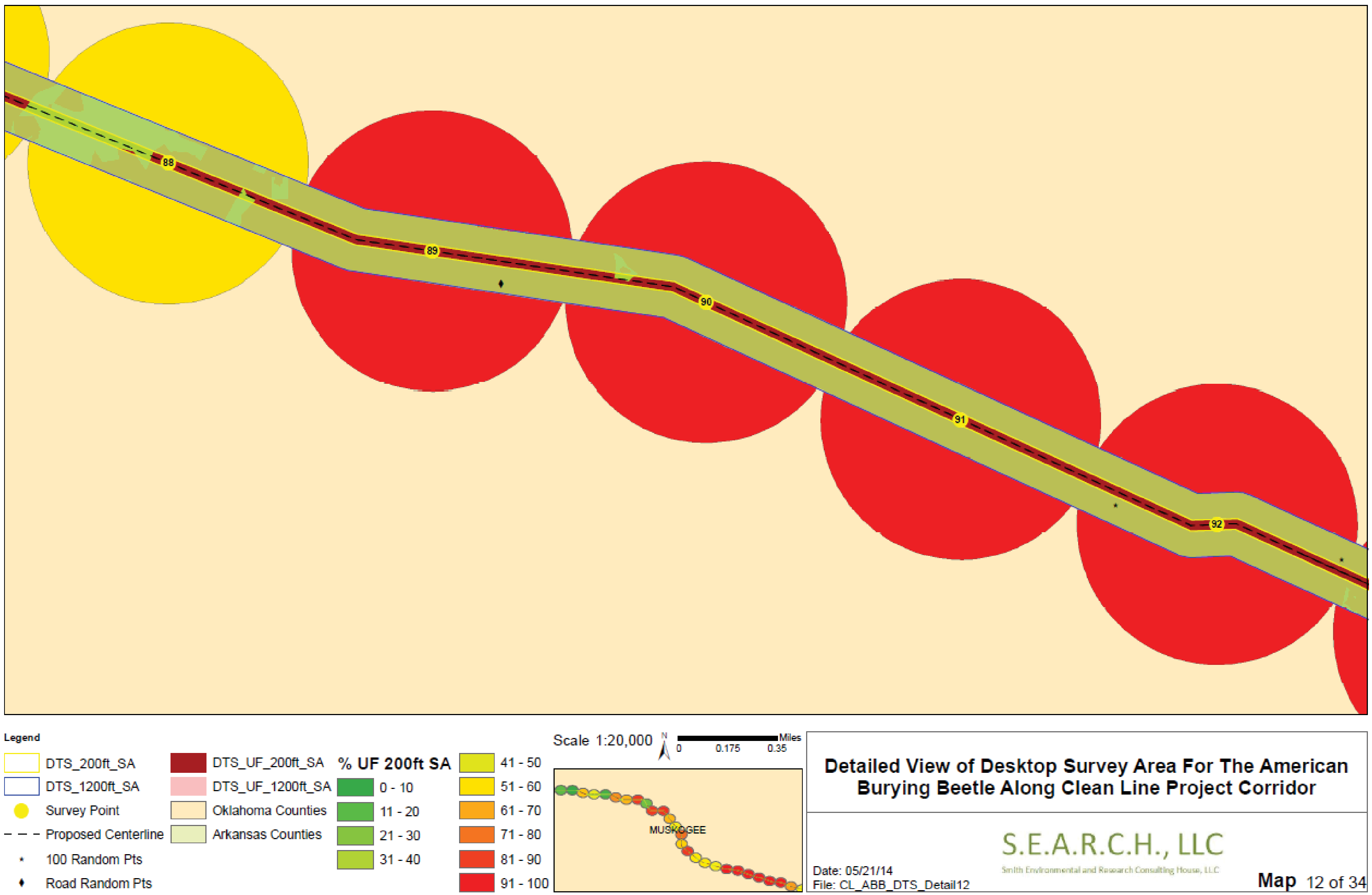
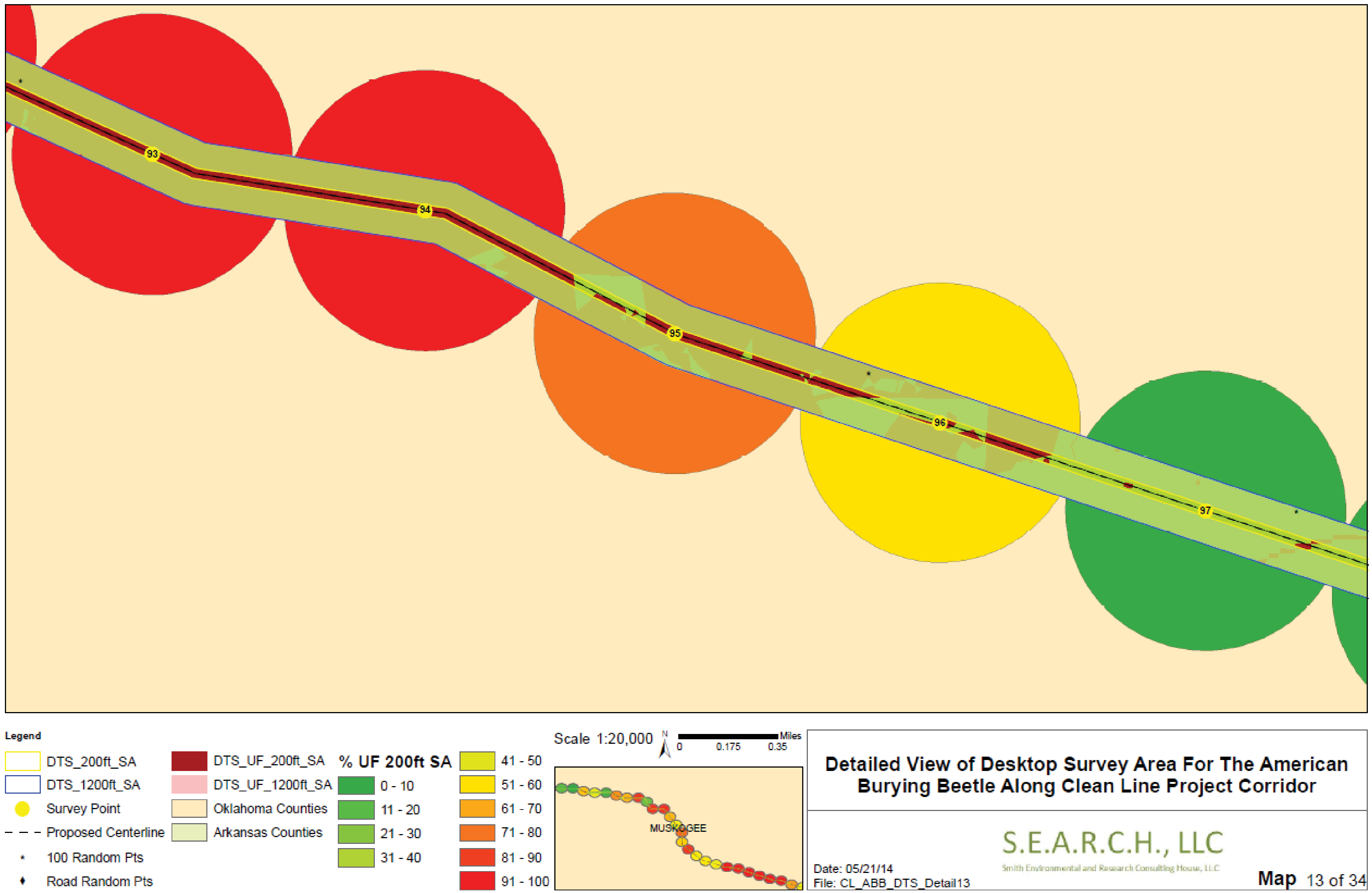
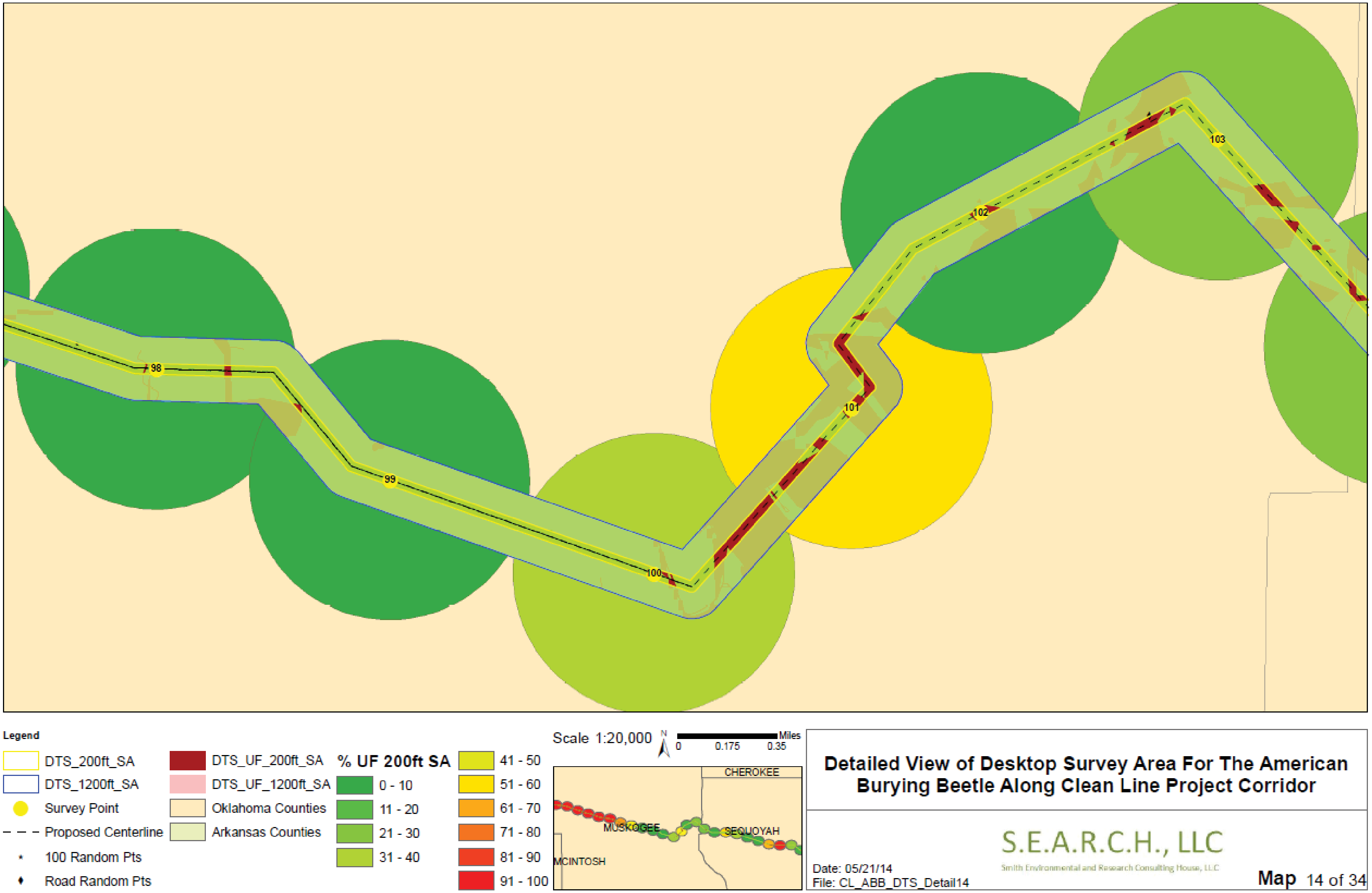
Habitat Suitability for the American Burying Beetle



Habitat Suitability for the American Burying Beetle

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Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor
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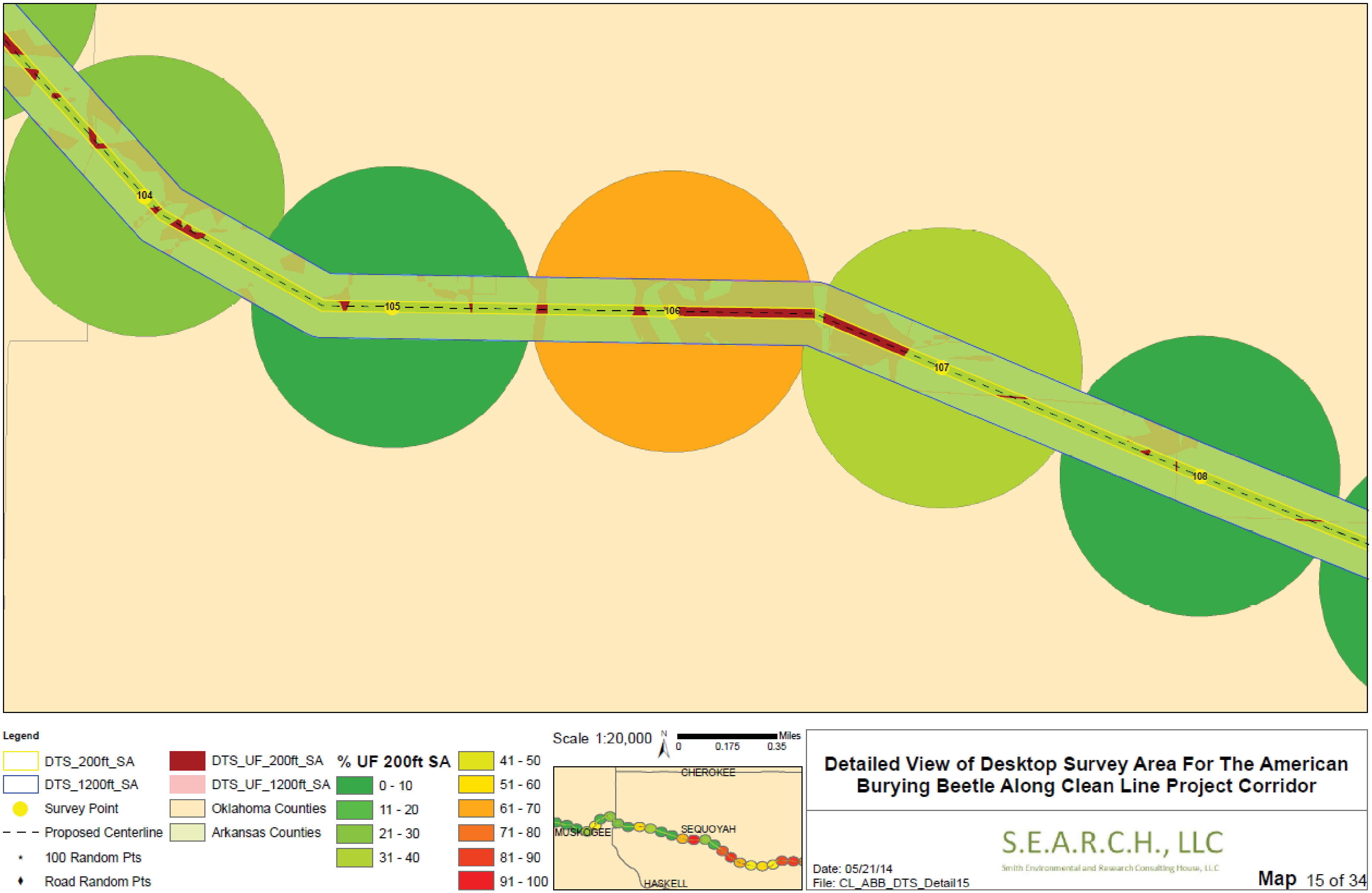
Habitat Suitability for the American Burying Beetle



Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor

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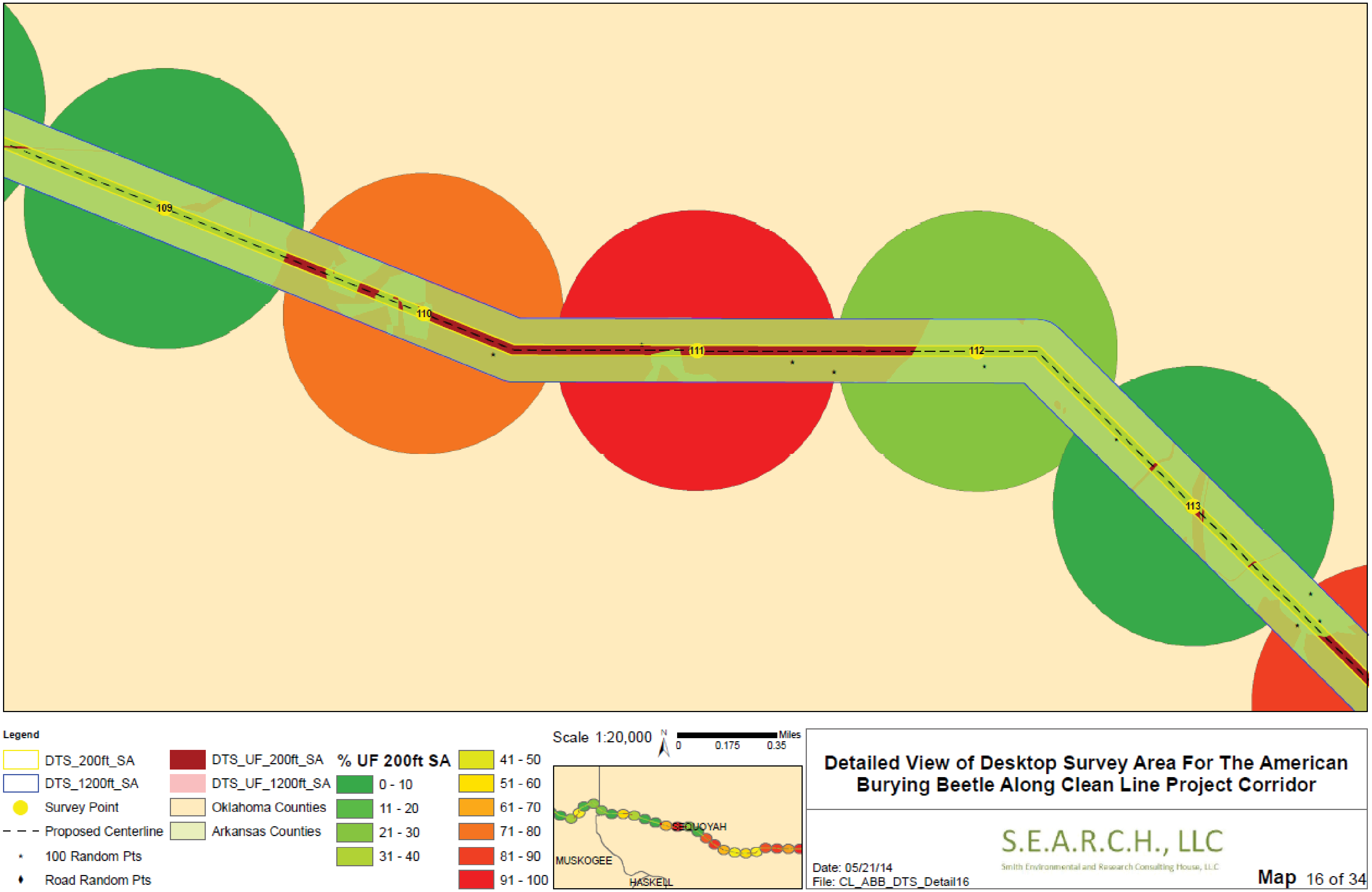
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Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor
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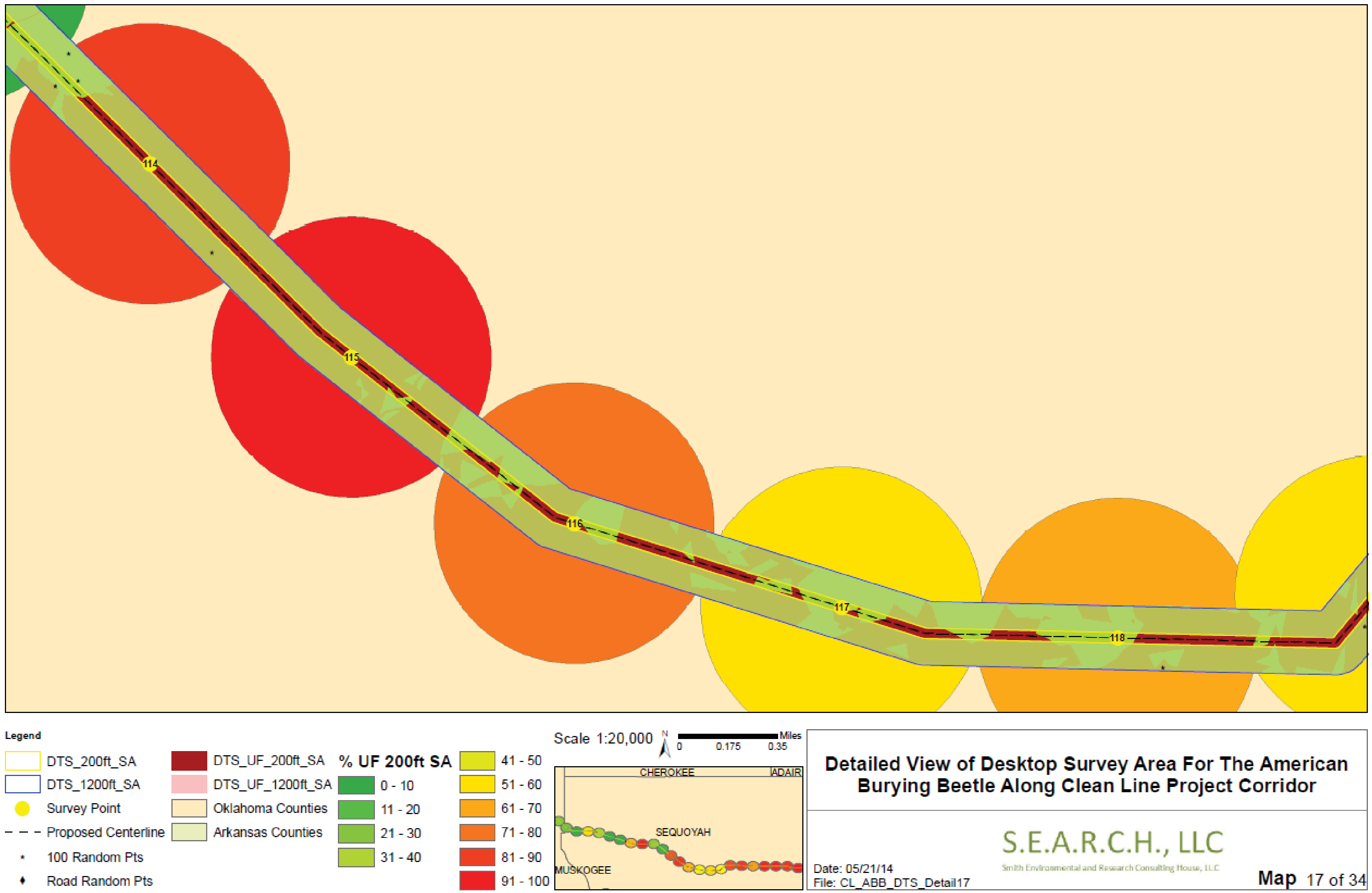

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Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor
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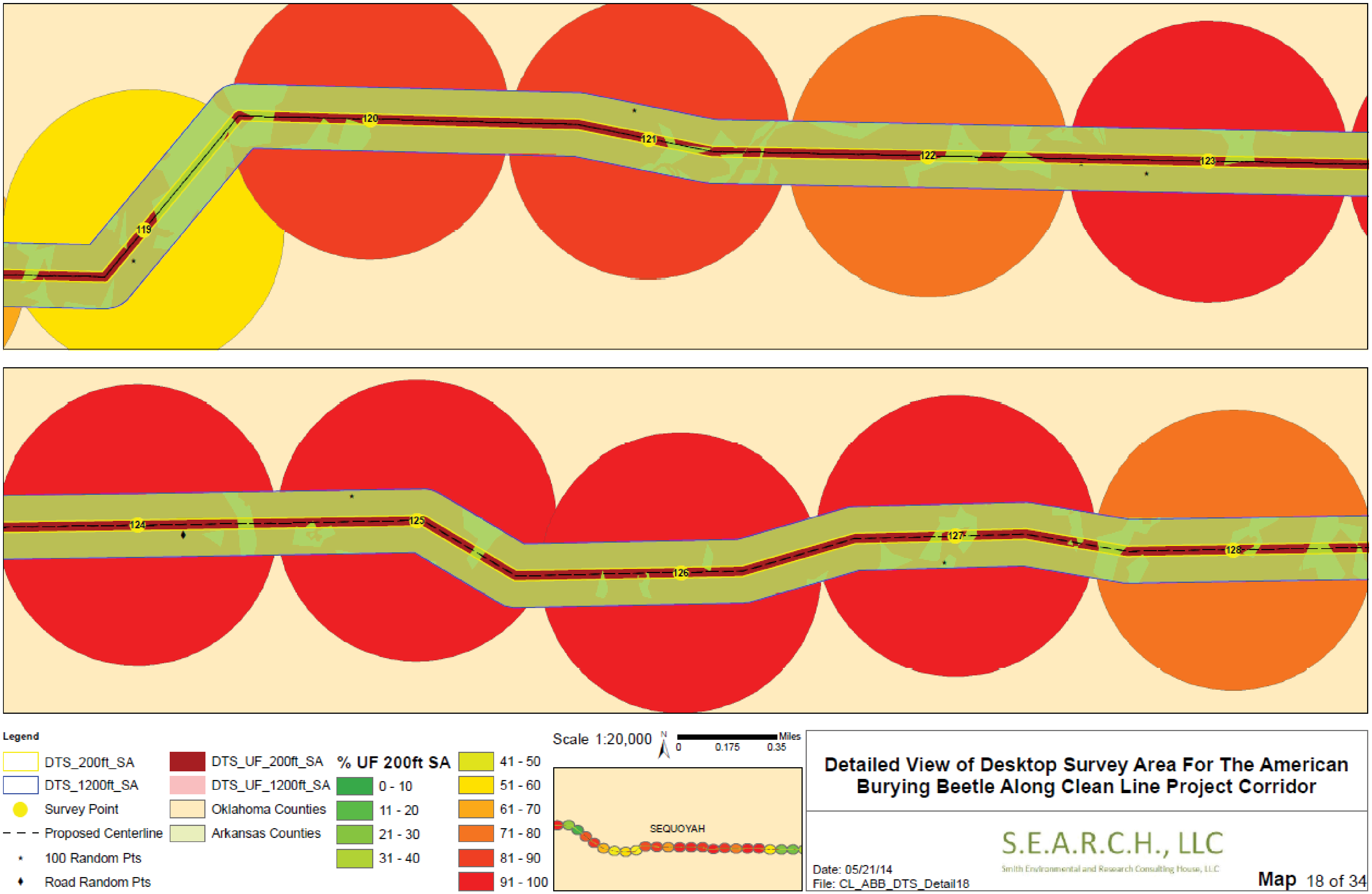
Habitat Suitability for the American Burying Beetle



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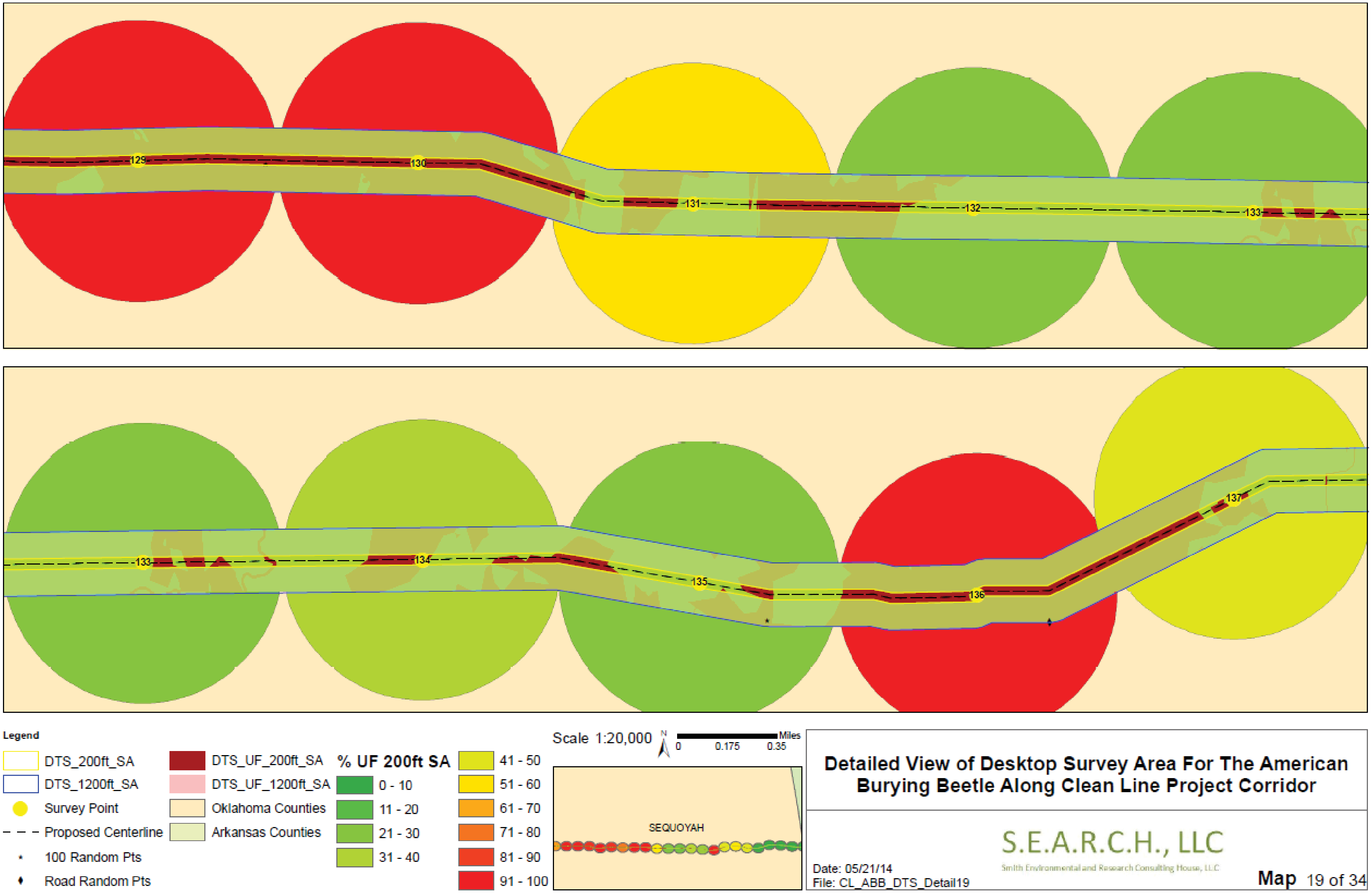
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Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor
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Smith Environmental and Research Consulting House, LLC
Date: 05/21/14
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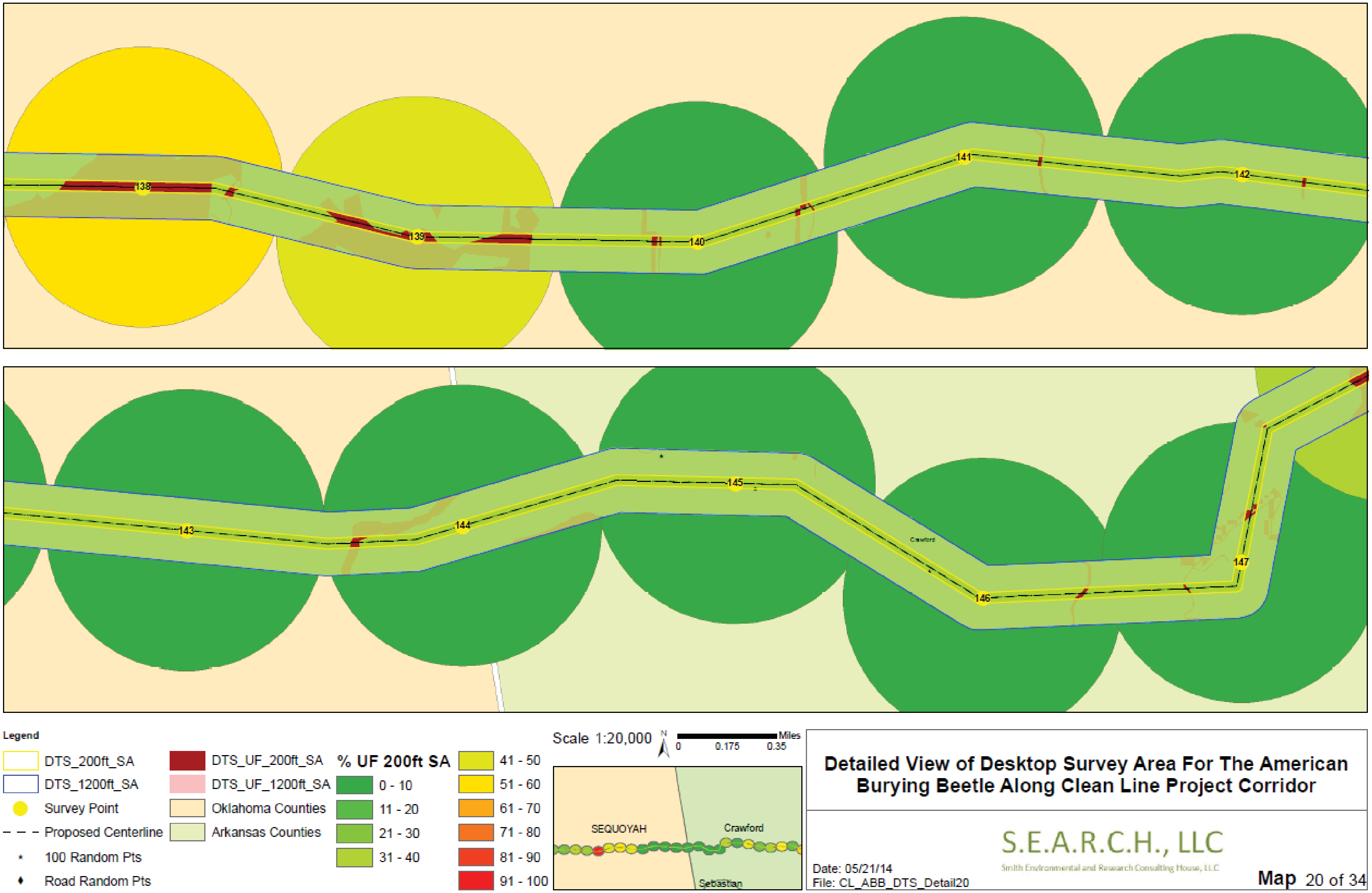
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DTS_UF_1200ft_SA
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Arkansas Counties
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Scale 1:20,000
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Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor
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Smith Environmental and Research Consulting House, LLC
Date: 05/21/14
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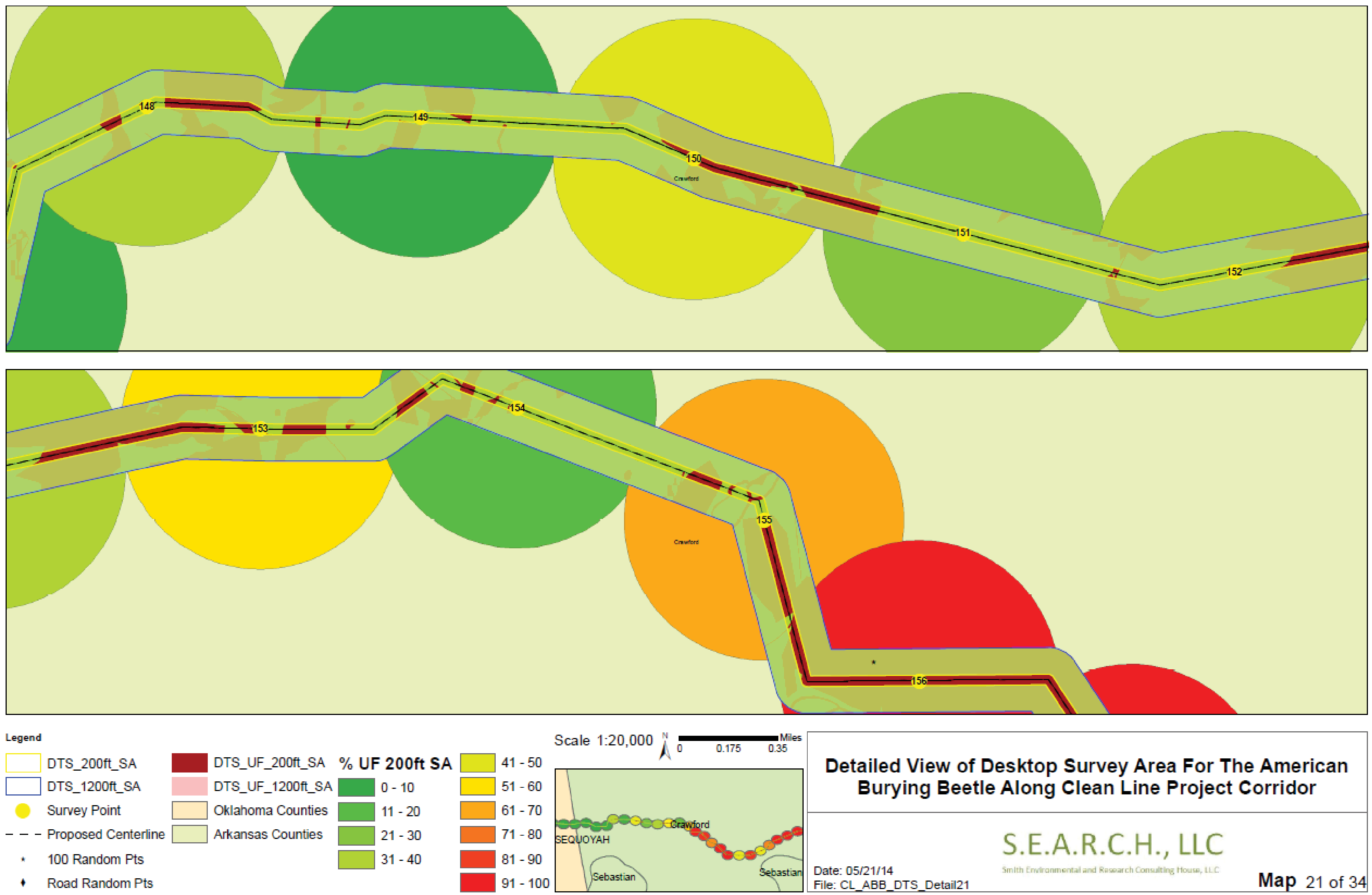

148
149
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Crawford
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155
Crawford
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Legend
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DTS_1200ft_SA
Survey Point
Proposed Centerline
100 Random Pts
Road Random Pts
DTS_UF_200ft_SA
DTS_UF_1200ft_SA
Oklahoma Counties
Arkansas Counties
% UF 200ft SA
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71 - 80
81 - 90
91 - 100
Scale 1:20,000
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SEQUOYAH
Crawford
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Sebastian
Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor
S.E.A.R.C.H., LLC
Smith Environmental and Research Consulting House, LLC
Date: 05/21/14
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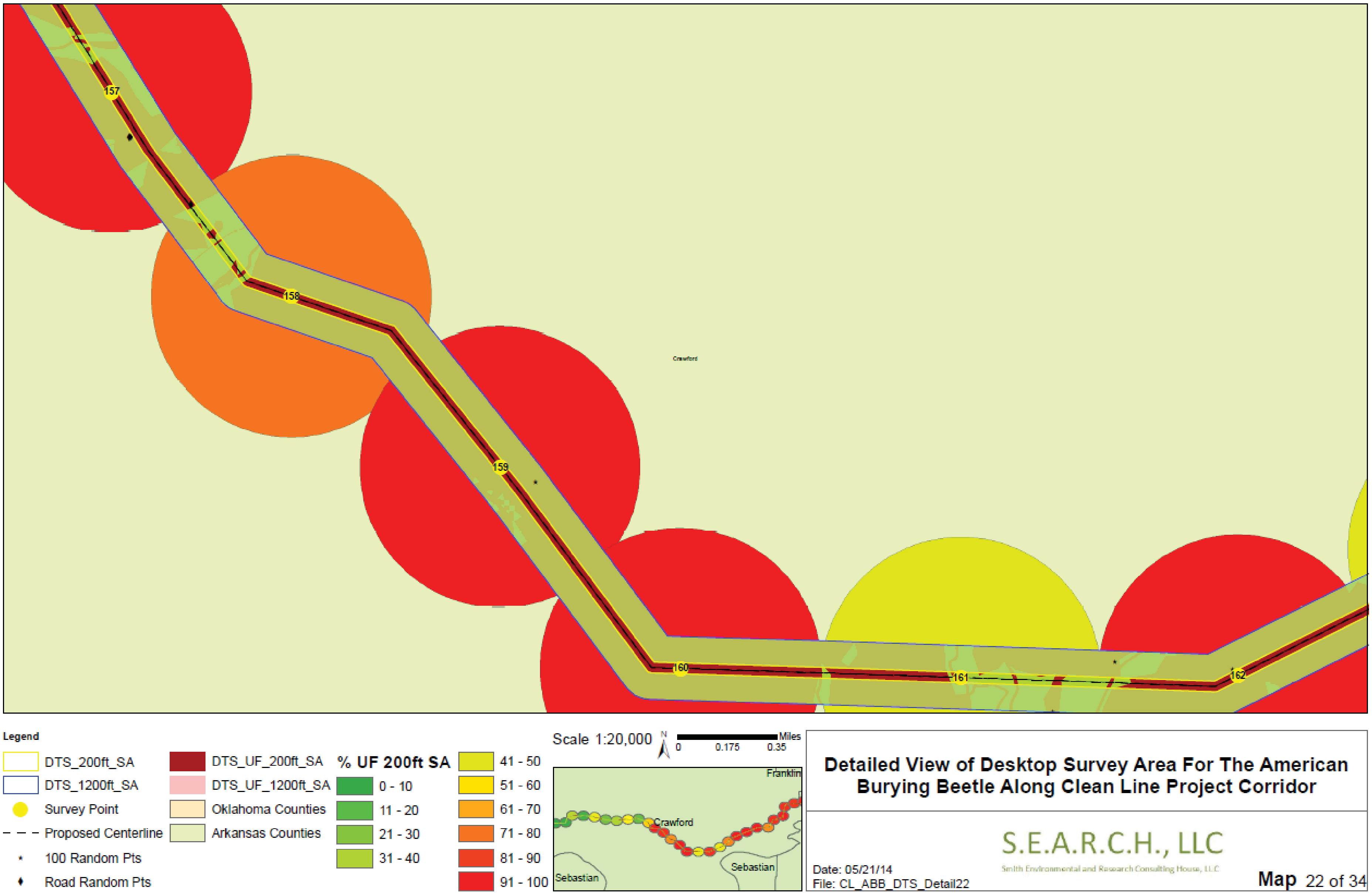
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Survey Point
Proposed Centerline
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Road Random Pts
DTS_UF_200ft_SA
DTS_UF_1200ft_SA
Oklahoma Counties
Arkansas Counties
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21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Scale 1:20,000
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0
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0.35
Miles
Franklin
Crawford
Sebastian
Sebastian
Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor
S.E.A.R.C.H., LLC
Smith Environmental and Research Consulting House, LLC
Date: 05/21/14
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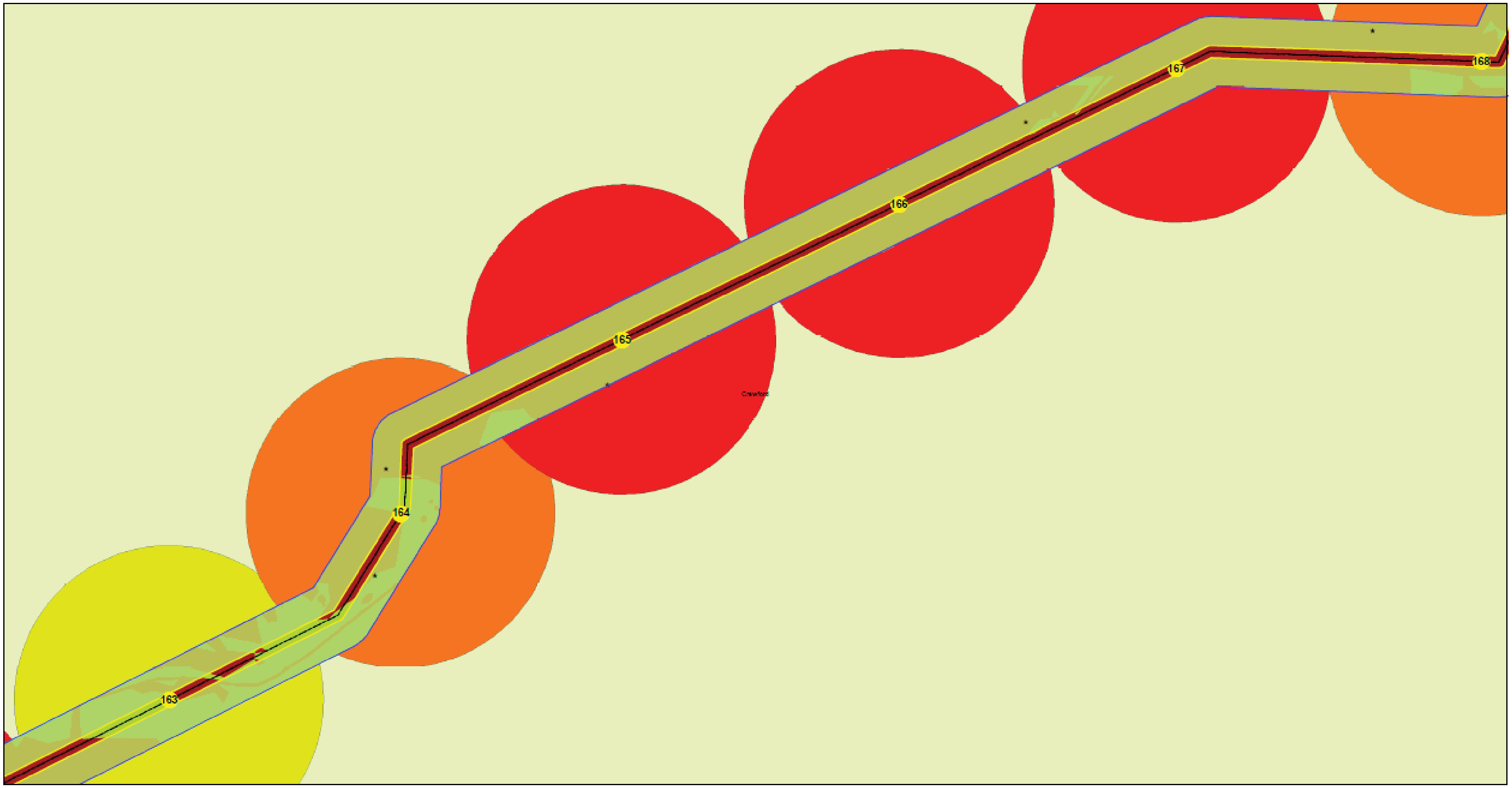

Legend

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Survey Point
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100 Random Pts
Road Random Pts
DTS_UF_200ft_SA
DTS_UF_1200ft_SA
Oklahoma Counties
Arkansas Counties

% UF 200ft SA

0 - 10
11 - 20
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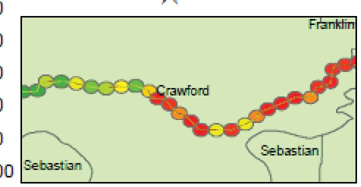
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100

Scale 1:20,000

0 0.175 0.35 Miles



Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor

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Date: 05/21/14
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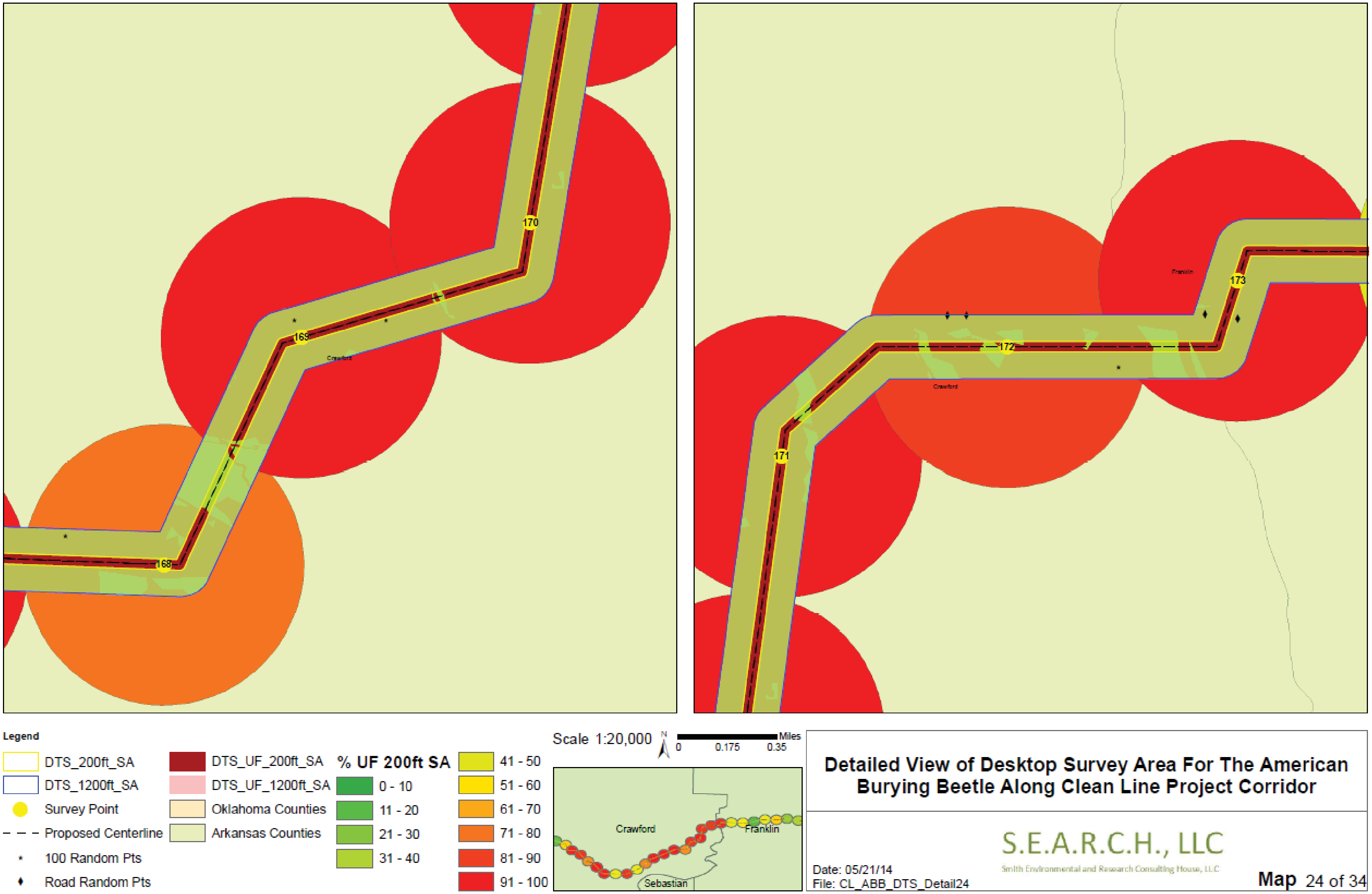

Legend

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- DTS_1200ft_SA
- Survey Point
- Proposed Centerline
- 100 Random Pts
- Road Random Pts
- DTS_UF_200ft_SA
- DTS_UF_1200ft_SA
- Oklahoma Counties
- Arkansas Counties

% UF 200ft SA

- 0 - 10
- 11 - 20
- 21 - 30
- 31 - 40
- 41 - 50
- 51 - 60
- 61 - 70
- 71 - 80
- 81 - 90
- 91 - 100

Scale 1:20,000 — 0, 0.175, 0.35 Miles

Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor

S.E.A.R.C.H., LLC
Smith Environmental and Research Consulting House, LLC

Date: 05/21/14
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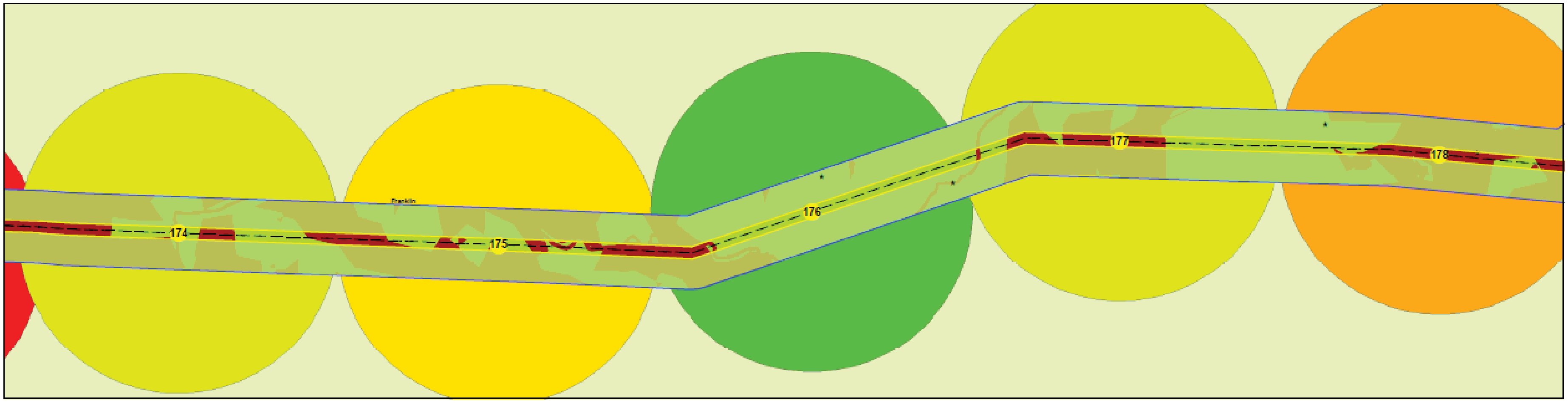
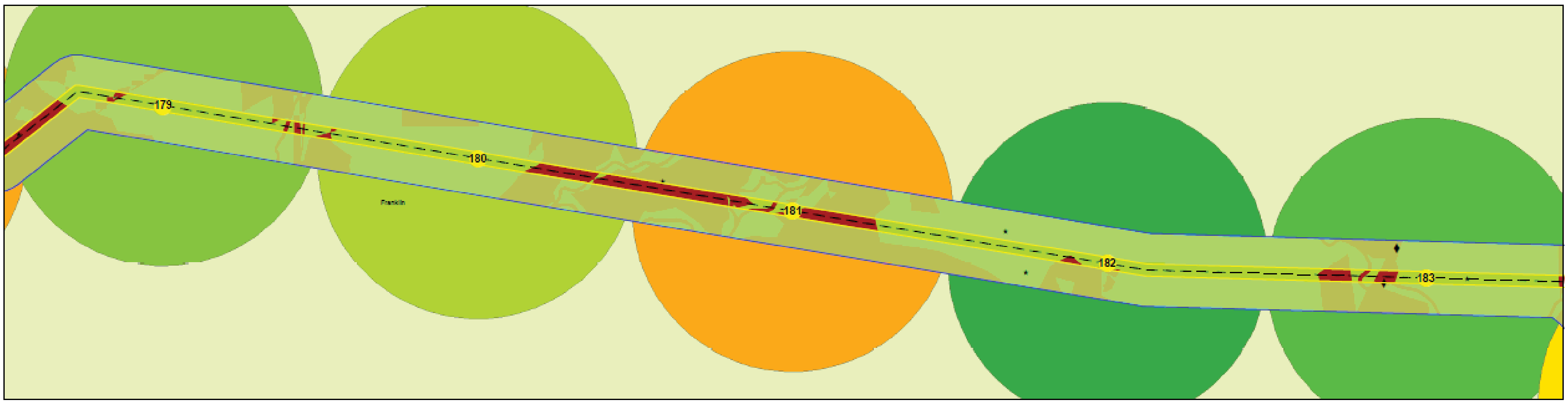
Habitat Suitability for the American Burying Beetle





Legend

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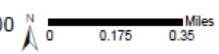
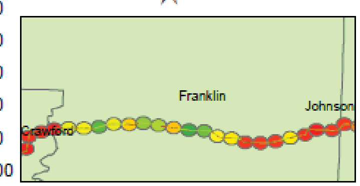
- DTS_1200ft_SA
- Survey Point
- Proposed Centerline
- 100 Random Pts
- Road Random Pts
- DTS_UF_200ft_SA
- DTS_UF_1200ft_SA
- Oklahoma Counties
- Arkansas Counties

% UF 200ft SA

- 0 - 10
- 11 - 20
- 21 - 30
- 31 - 40
- 41 - 50
- 51 - 60
- 61 - 70
- 71 - 80
- 81 - 90
- 91 - 100

Scale 1:20,000





Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor

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Smith Environmental and Research Consulting House, LLC

Date: 05/21/14
File: CL_ABB_DTS_Detail25

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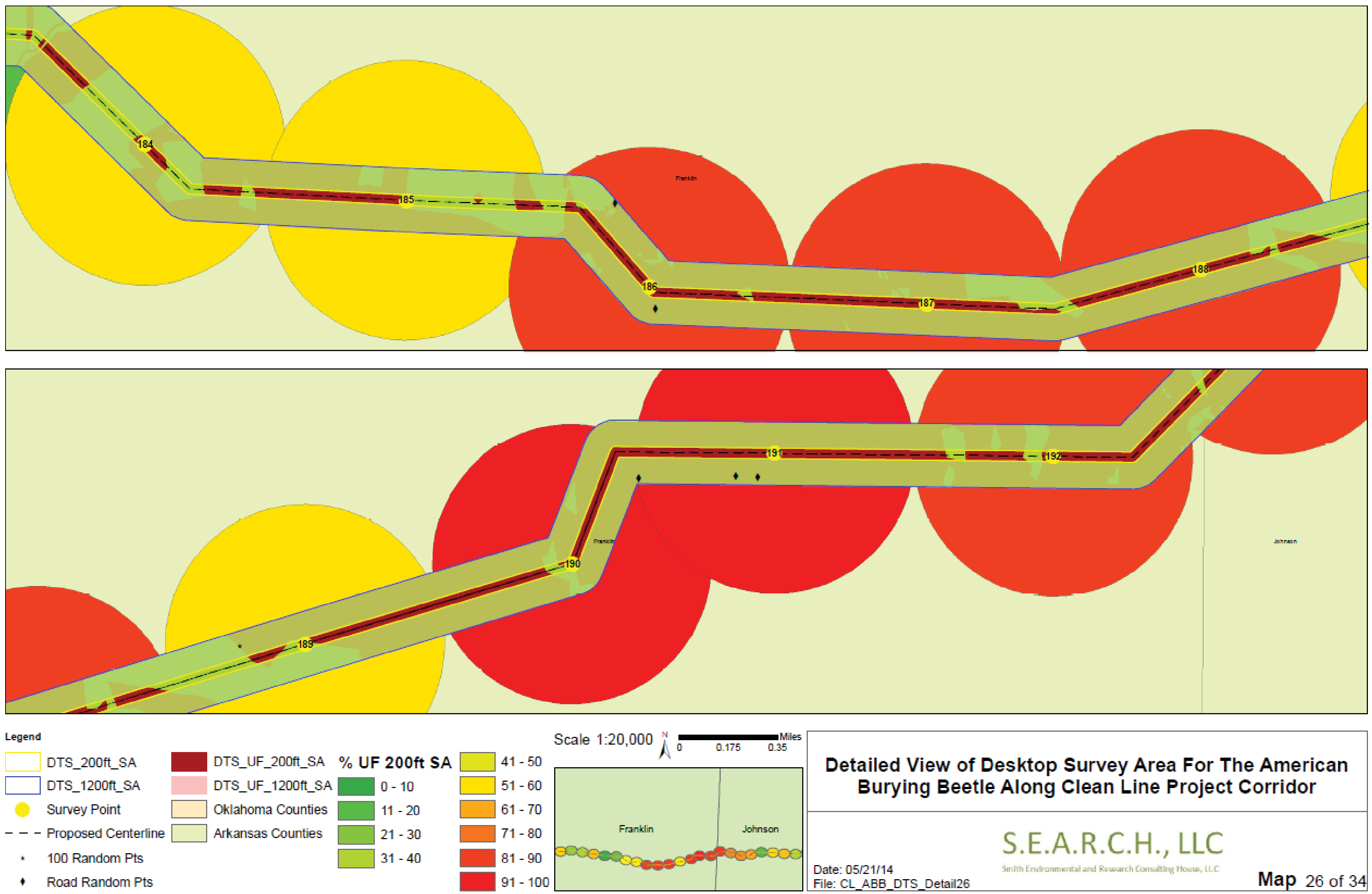
Franklin
Johnson
184
185
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Legend
DTS_200ft_SA
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Survey Point
Proposed Centerline
100 Random Pts
Road Random Pts
DTS_UF_200ft_SA
DTS_UF_1200ft_SA
Oklahoma Counties
Arkansas Counties
% UF 200ft SA
0 - 10
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21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Scale 1:20,000
N
0 0.175 0.35 Miles
Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor
S.E.A.R.C.H., LLC
Smith Environmental and Research Consulting House, LLC
Date: 05/21/14
File: CL_ABB_DTS_Detail26
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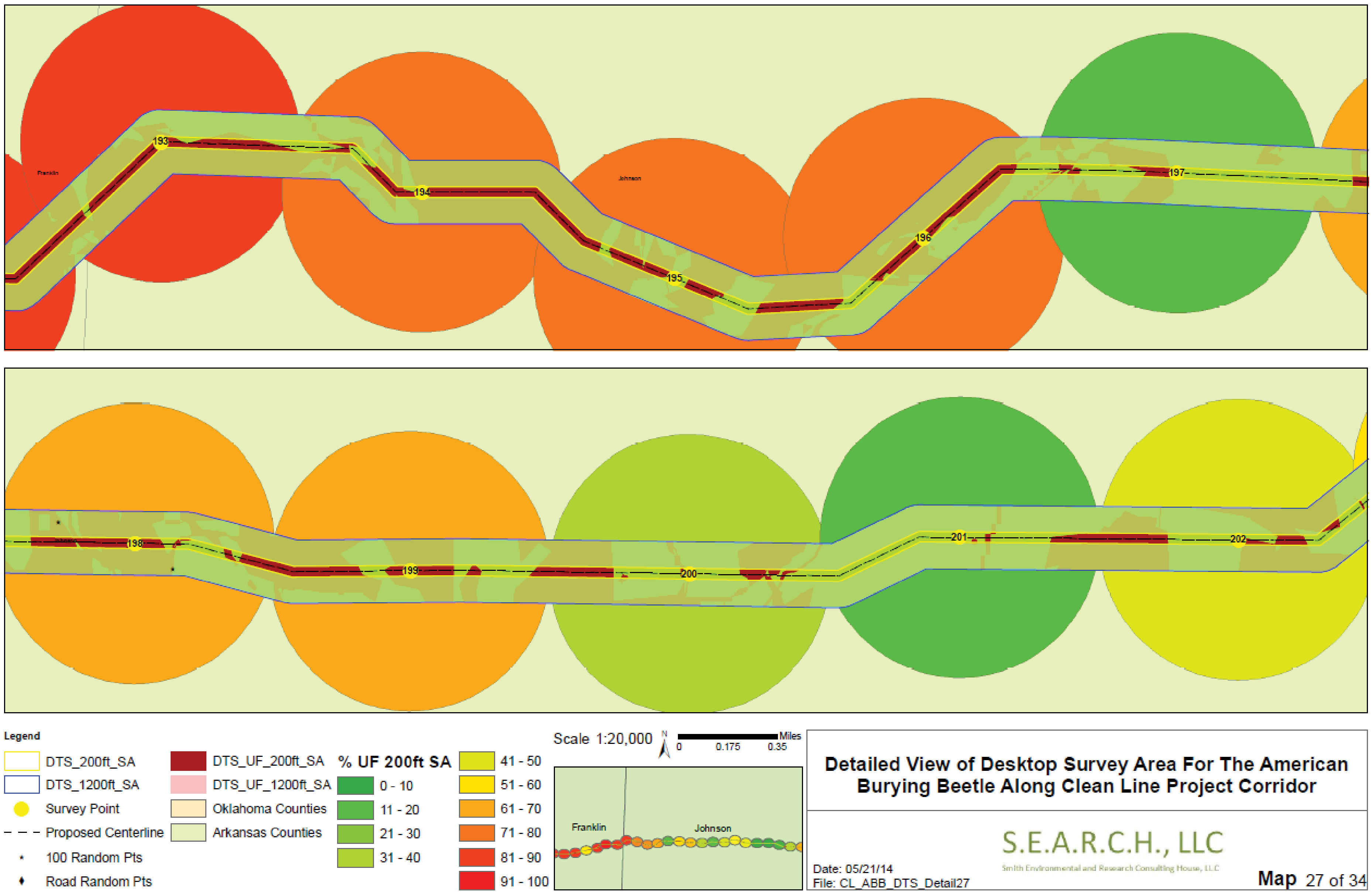
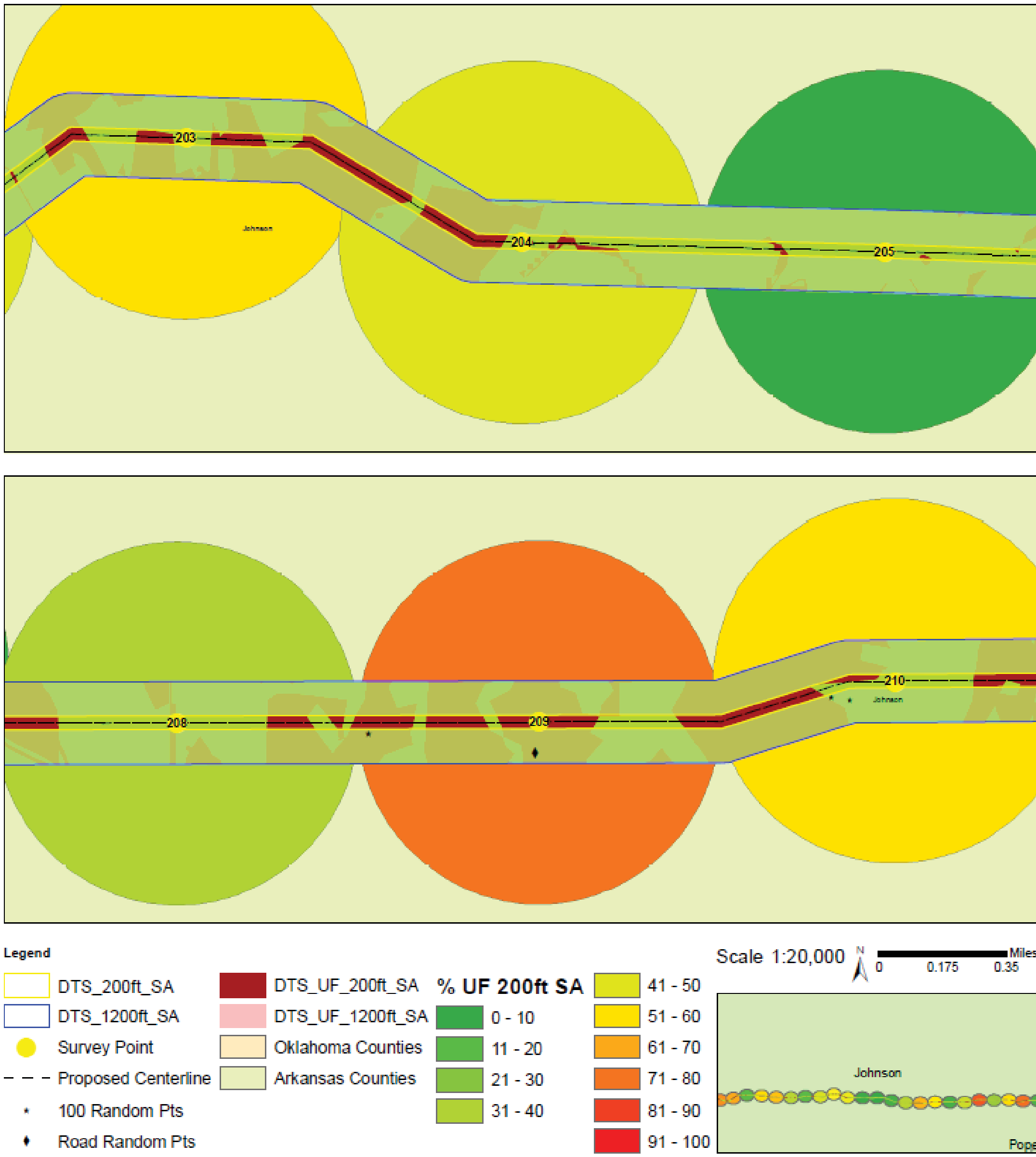
Habitat Suitability for the American Burying Beetle





Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor

S.E.A.R.C.H., LLC

Smith Environmental and Research Consulting House, LLC

Date: 05/21/14

File: CL_ABB_DTS_Detail28

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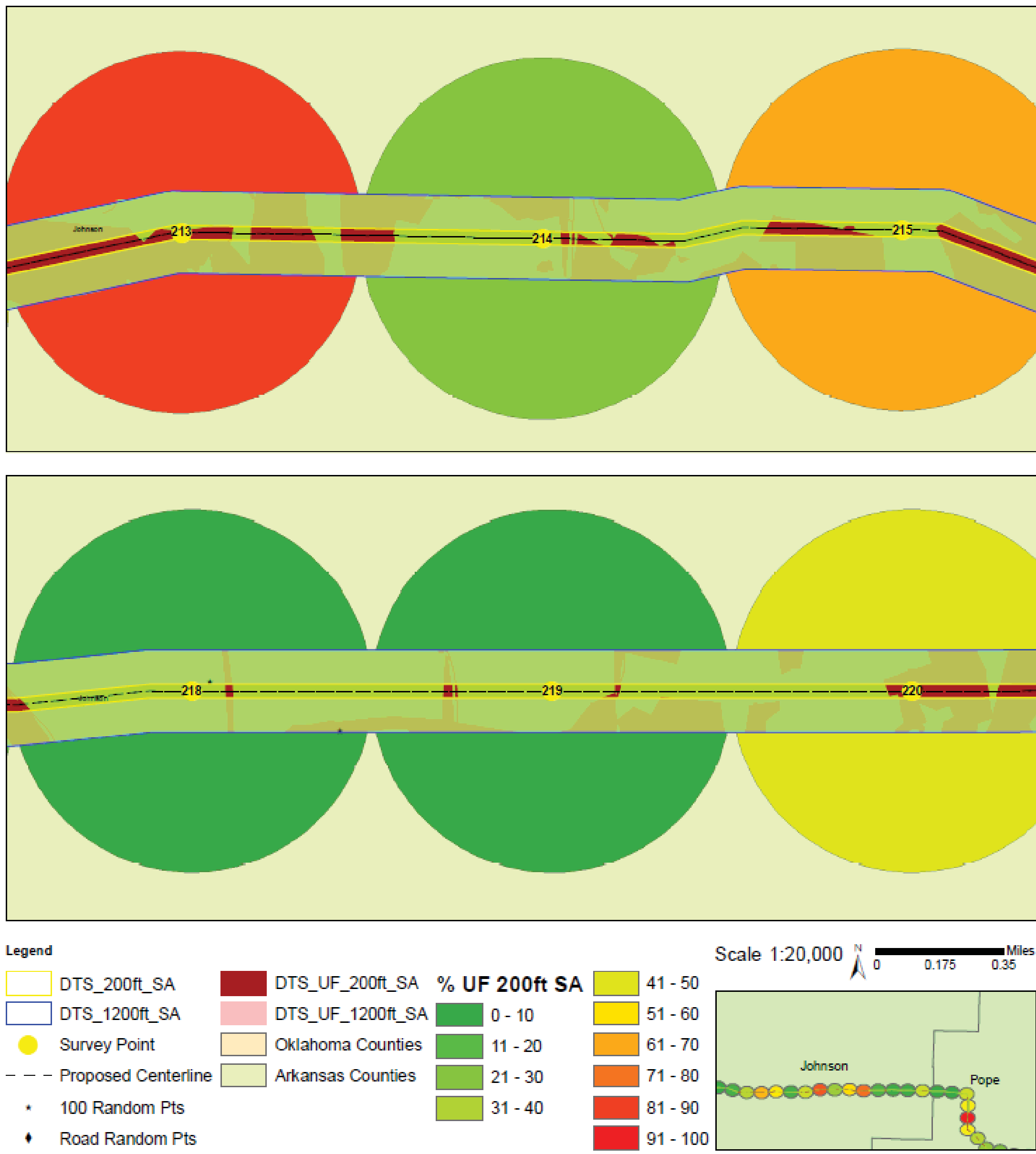
Maps beyond this page were used in the desktop analysis but are not part of the current ABB range in Arkansas. They are provided here as a resource only.



Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor

S.E.A.R.C.H., LLC

Smith Environmental and Research Consulting House, LLC

Date: 05/21/14

File: CL_ABB_DTS_Detail29

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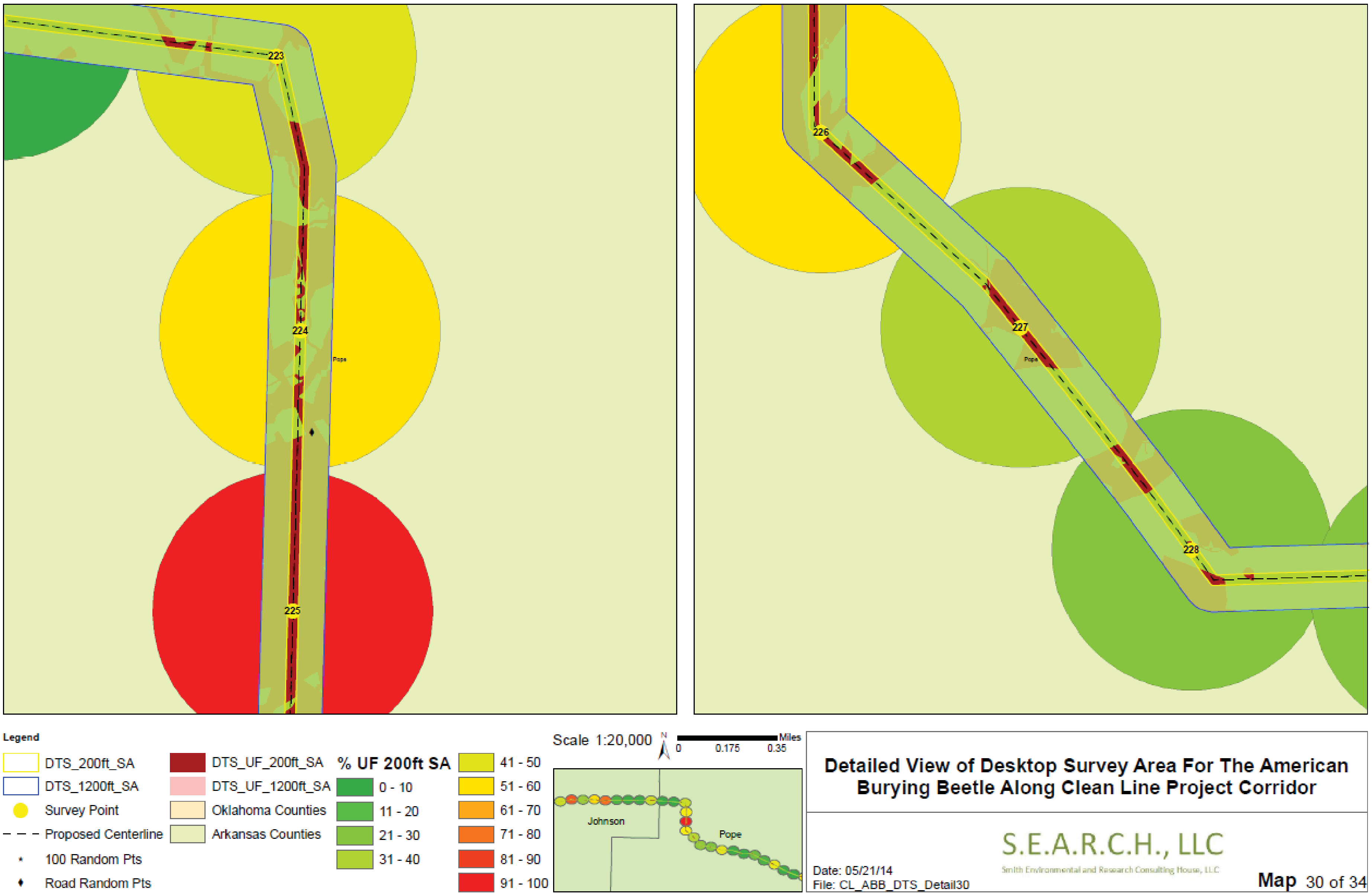
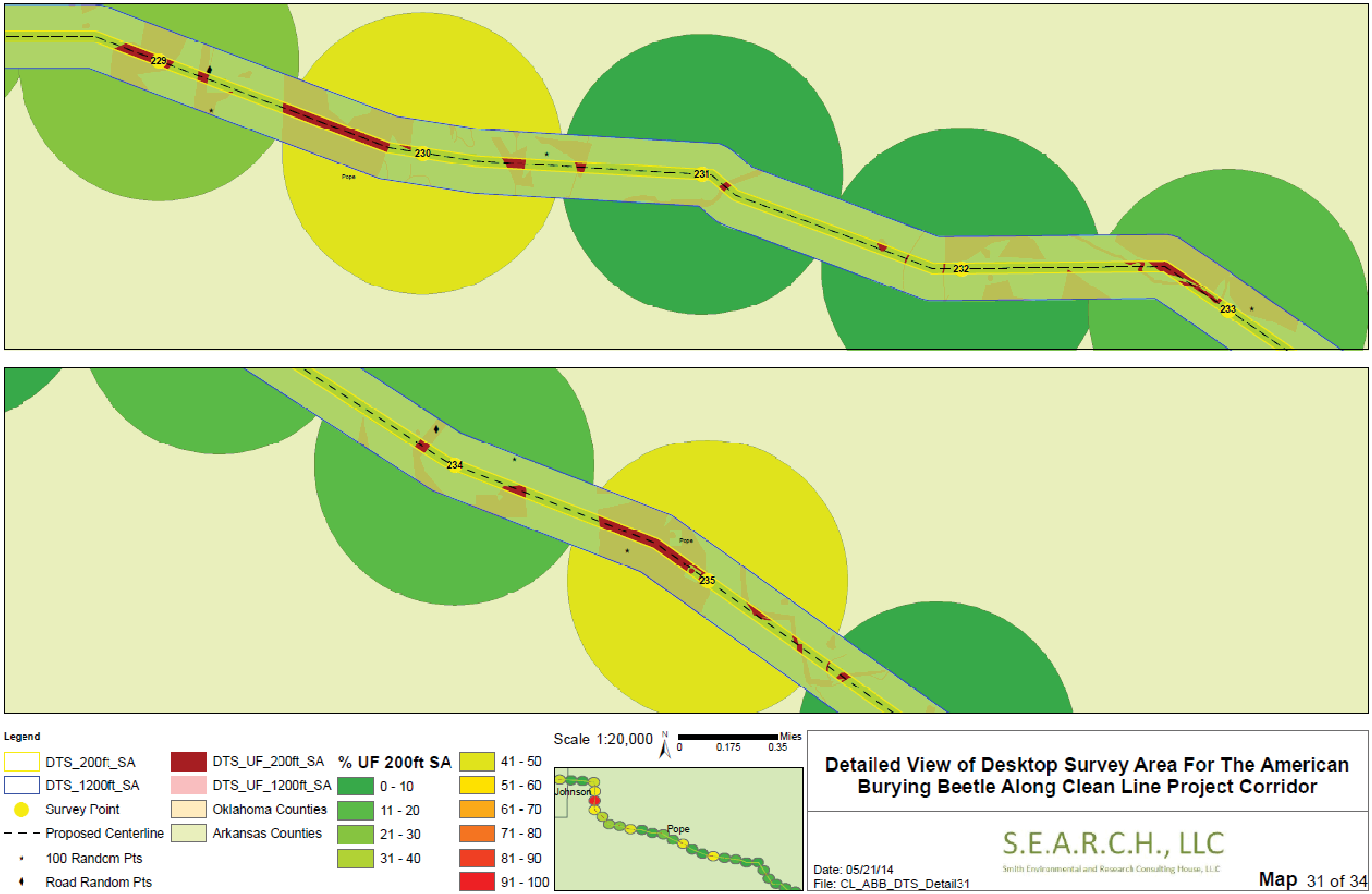
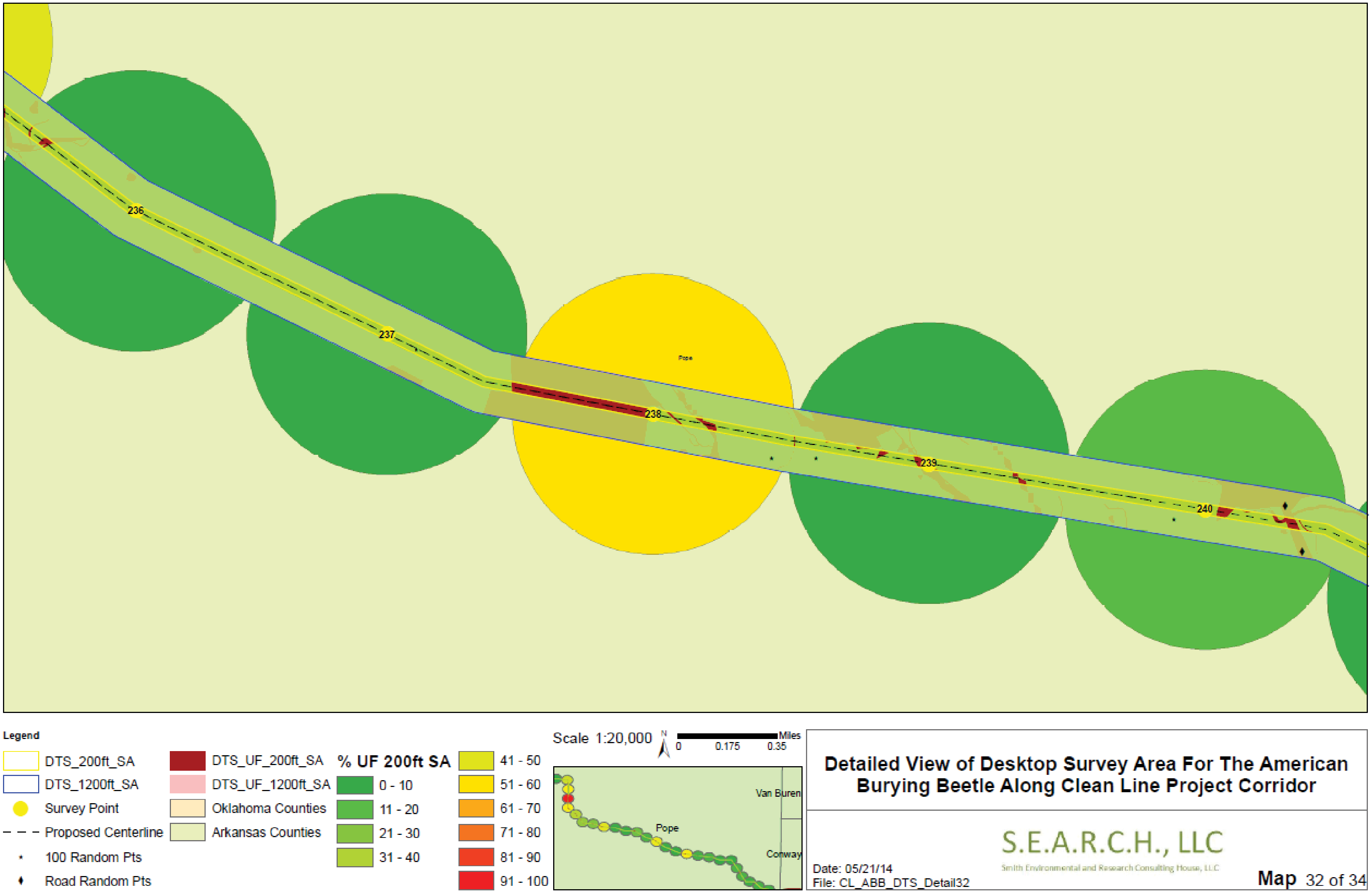
Habitat Suitability for the American Burying Beetle



Pre-Decisional; Subject to Revision; Not for Public Distribution

Habitat Suitability for the American Burying Beetle





Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor

S.E.A.R.C.H., LLC
Smith Environmental and Research Consulting House, LLC

Date: 05/21/14
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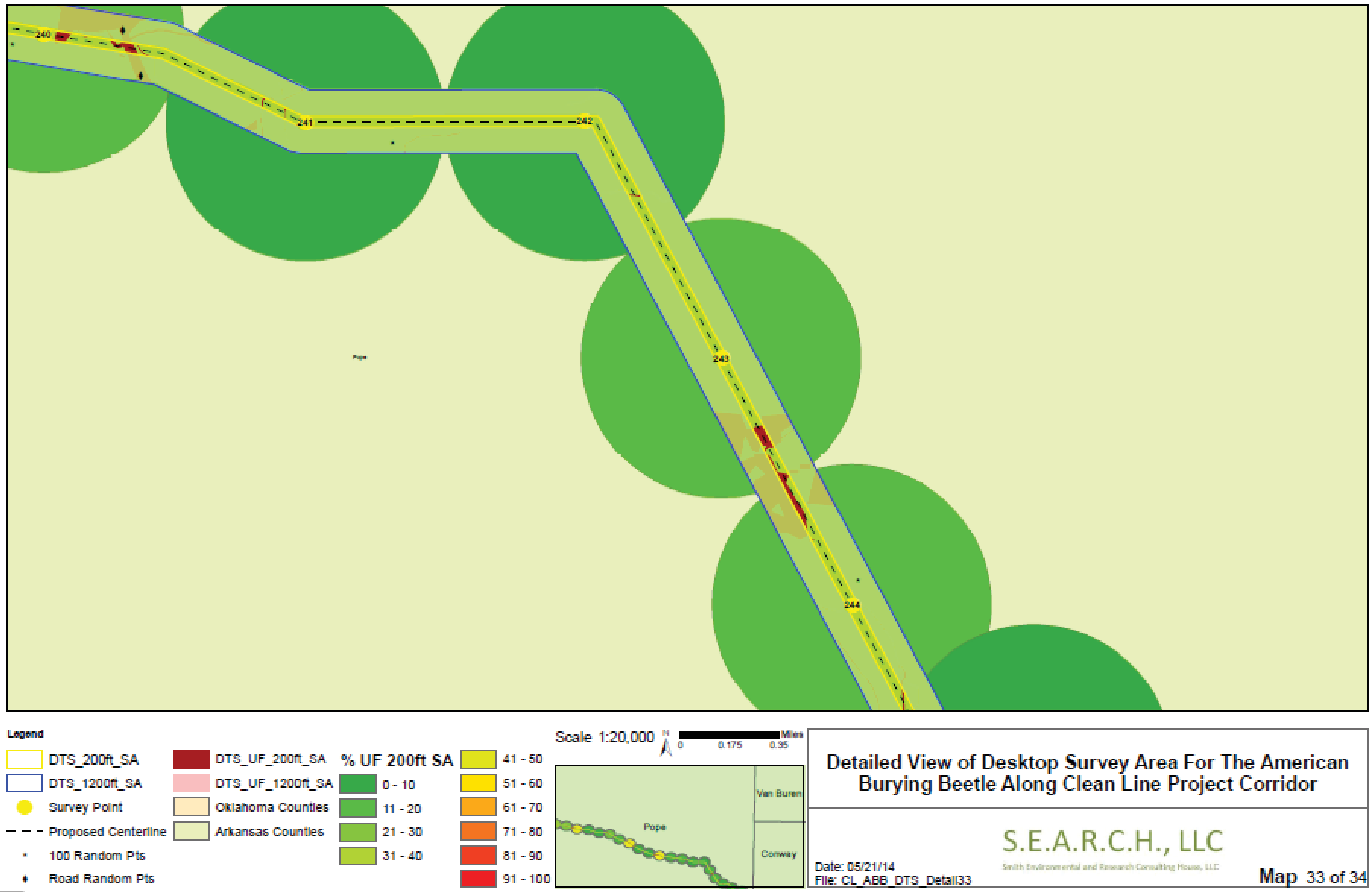

Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor

S.E.A.R.C.H., LLC

Smith Environmental and Research Consulting House, LLC

Date: 05/21/14

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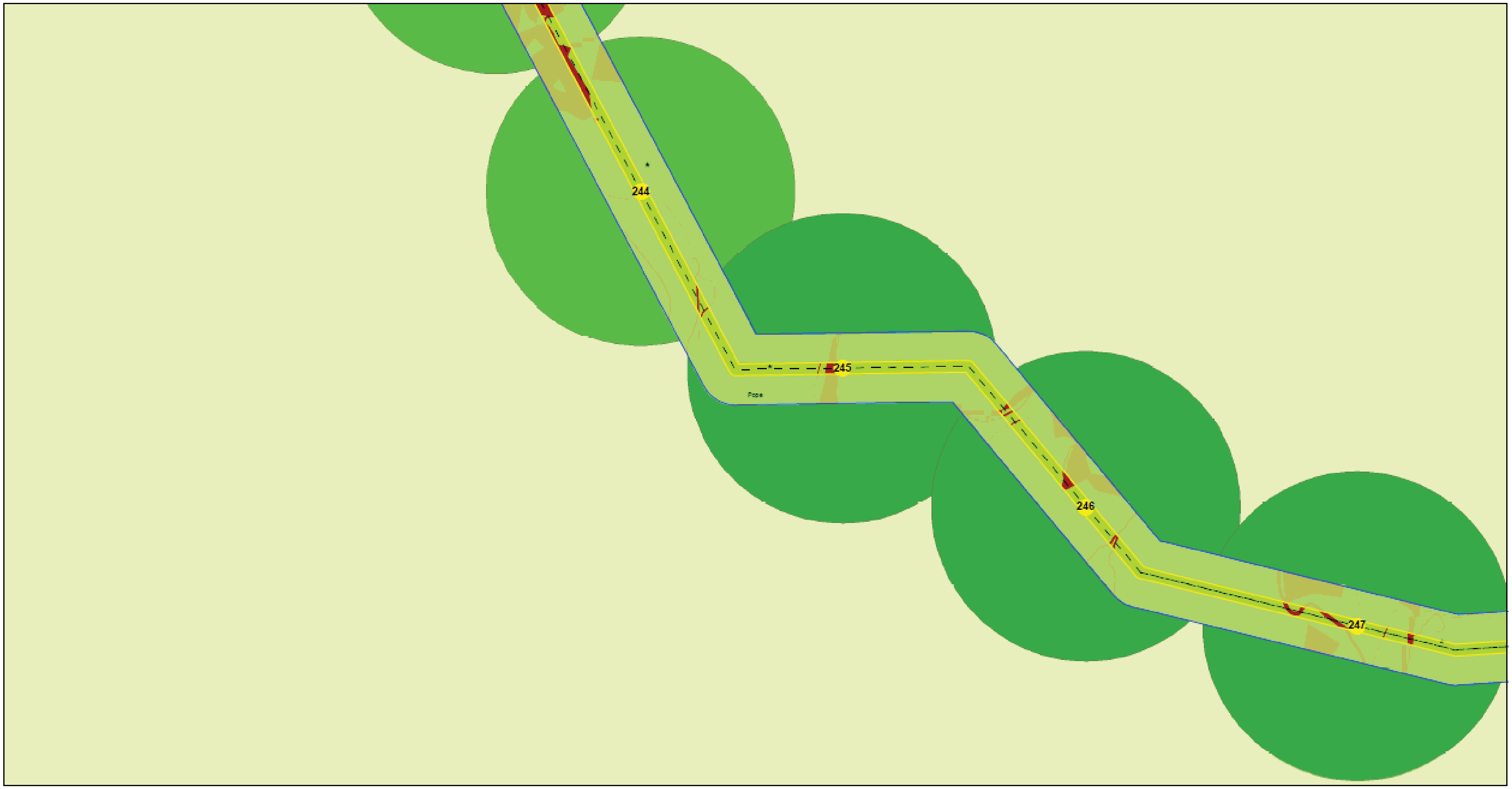


Legend

- DTS_200ft_SA
- DTS_1200ft_SA
- Survey Point
- Proposed Centerline
- 100 Random Pts
- Road Random Pts
- DTS_UF_200ft_SA
- DTS_UF_1200ft_SA
- Oklahoma Counties
- Arkansas Counties

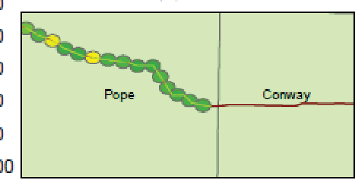
% UF 200ft SA

- 0 - 10
- 11 - 20
- 21 - 30
- 31 - 40
- 41 - 50
- 51 - 60
- 61 - 70
- 71 - 80
- 81 - 90
- 91 - 100

Scale 1:20,000

N

0 0.175 0.35 Miles



Detailed View of Desktop Survey Area For The American Burying Beetle Along Clean Line Project Corridor

S.E.A.R.C.H., LLC

Smith Environmental and Research Consulting House, LLC

Date: 05/21/14

File: CL_ABB_DTS_Detail34

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APPENDIX B

Point 1. Southeast view with favorable habitat.

Point 1. Northwest view with favorable habitat.

Point 2. East view with favorable habitat.

Point 2. West view with favorable habitat.

Point 3. East view with favorable habitat.

Point 3. West view with favorable habitat.

Point 4. East view with unfavorable habitat.

Point 4. West view with favorable habitat.

Point 5. East view with unfavorable habitat.

Point 5. West view with unfavorable habitat

Point 6. East view with favorable habitat.

Point 6. West view with unfavorable habitat. A house exists behind the trees.

Point 7. East view with unfavorable habitat. Pasture is located behind trees.

Point 7. West view with unfavorable habitat.

Point 8. North view with unfavorable habitat.

Point 8. South view with unfavorable habitat.

Point 9. North view with unfavorable habitat.

Point 9. South with unfavorable habitat.

Point 10. North with unfavorable habitat.

Point 10. South with unfavorable habitat.

Point 11. Northwest view with favorable habitat in riparian (vegetated) zone.

Point 11. Southeast view with favorable habitat in riparian zone.

Point 12. Northeast with unfavorable habitat. Pasture exists behind the tree line.

Point 12. Southeast with favorable habitat.

Point 13. North view with favorable habitat.

Point 13. South view with favorable habitat.

Point 14. North view with favorable habitat.

Point 14. South view with favorable habitat.

Point 15. North view with unfavorable habitat. Pasture occurs beyond tree line.

Point 15. South view with unfavorable habitat. Pasture occurs beyond tree line.

Point 16. North view with unfavorable habitat. Pasture exists beyond the tree line.

Point 16. South view with unfavorable habitat. Pasture exists beyond the trees.

Point 17. East view with unfavorable habitat.

Point 17. West view with favorable habitat behind the house.

Point 18. Northwest with favorable habitat.

Point 18. Southeast with unfavorable habitat. Pasture lies behind.

Point 19. North view with unfavorable habitat.

Point 19. South view with unfavorable habitat.

Point 20. Northeast view with favorable habitat.

Point 20. Southwest view with favorable habitat. The riparian zone is favorable.

Point 21. East view with unfavorable habitat.

Point 21. West view with unfavorable habitat. This was pasture.

Point 22. East view with unfavorable habitat. This was a house with a yard. No photo was taken because the family was outside and looked like they might just shoot.	 Point 22. West view with unfavorable habitat.
Point 23. North view with unsuitable habitat. Photo unavailable.	Point 23. South view with favorable habitat. Photo unavailable.
 Point 24. North view with unfavorable habitat. Pasture lies behind the trees in the fence row.	 Point 24. South view with favorable habitat.

Point 25. Northwest view with unfavorable habitat. Forested area is more than 50 meters off road.

Point 25. Southeast view with favorable habitat.

Point 26. East view with favorable habitat.

Point 26. West view with favorable habitat.

Point 27. East view with suitable habitat.

Point 27. West view with unfavorable habitat.

Point 28. Northwest view with favorable habitat.

Point 28. Southeast view with favorable habitat.

Point 29. Northwest view with unfavorable habitat.

Point 29. Southeast view with favorable habitat. Forested area is 50 meters away.

Point 30. East view with favorable habitat.

Point 30. West view is favorable.

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Appendix D
Bat Habitat Assessment of the Clean Line Plains & Eastern Transmission Line Project, Oklahoma, Arkansas, and Tennessee

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SWCA®
ENVIRONMENTAL CONSULTANTS
Sound Science. Creative Solutions.®

Bat Habitat Assessment of the Plains & Eastern Clean Line Transmission Line Project, Oklahoma, Arkansas, and Tennessee

Prepared for

Clean Line Energy Partners LLC

Prepared by

SWCA Environmental Consultants

November 2014

SWCA Project No. 27517.03-AUS

BAT HABITAT ASSESSMENT OF THE PLAINS & EASTERN CLEAN LINE TRANSMISSION LINE PROJECT, OKLAHOMA, ARKANSAS, AND TENNESSEE

Prepared for

CLEAN LINE ENERGY PARTNERS LLC
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Houston, Texas 77002

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Building 1, Suite 110
Austin, Texas 78749
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September 24, 2014
Revised November 19, 2014

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Appendix C Photographic Log

Appendix D Field Data Forms

Appendix E Additional Karst Photographs

1.0 INTRODUCTION

SWCA Environmental Consultants (SWCA) was contracted by Plains and Eastern Clean Line LLC and Plains and Eastern Clean Line Oklahoma LLC (collectively "Clean Line"), wholly owned subsidiaries of Clean Line Energy Partners LLC (Clean Line or project proponent), to evaluate bat habitat along their proposed Plains & Eastern transmission line project (project). The project is anticipated to follow a linear route stretching from the Oklahoma panhandle east to near Memphis, Tennessee.

Portions of the project are within the range of three species of bat classified as endangered by the Endangered Species Act of 1973 as amended (ESA), and one species of bat that is currently proposed for listing under the ESA.

The risk of impacts to listed species as a result of project activities, as well as the determination of potential project effects on listed species, is dependent upon species occurrence in the area of impact. Presence/absence surveys for bats have not been conducted on the project area. Where there are no project-specific presence/absence survey data, the USFWS and project proponent must consider both the overall habitat quality and any existing occurrence records to infer the potential for focal bat species to occur on the project area and be affected by project activities. If there are no project-specific survey data, but suitable habitat exists on the project area and there are occurrence records in the vicinity, a conservative approach is to assume presence of the species within areas of suitable habitat. In the case of the project and the four focal bat species, "suitable habitat" may include forested areas used as summer roosting or foraging habitat, and the caves and cave-like structures used for breeding, sheltering, and/or winter hibernation.

1.1 BACKGROUND

Clean Line identified the Applicant Proposed Route and defined a 300-foot (ft) (91.4 meter [m]) linear corridor within which they requested bat habitat surveys. This 300-ft (91.4 m) corridor spans the ranges of all four focal bat species, initiating in Muskogee County, Oklahoma, and terminating in Shelby County, Tennessee (study area; Figure 1). While the project is expected to span close to 700 miles (mi) (1,127 kilometers [km]), the study area identified for bat habitat assessment measures approximately 373 mi (600 km) in length. The study area was selected to encompass any portion of the Applicant Proposed Route that lies within the range of one of the four focal bat species (Figure 2). Any part of the Applicant Proposed Route that was outside of the range of any focal bat species (e.g., the portion of the route between the western terminus of the Applicant Proposed Route and the Okmulgee-Muskogee county line in Oklahoma) was eliminated from this bat habitat assessment effort.

1.2 FOCAL BAT SPECIES

Four bat species have been identified as focal species for the purposes of this habitat assessment. The Indiana bat (*Myotis sodalis*), gray bat (*M. grisescens*), and Ozark big-eared bat (*Corynorhinus townsendii ingens*) are all federally endangered species with ranges that overlap the project area. The northern long-eared bat (*M. septentrionalis*) is proposed for listing as endangered. The listing was originally anticipated to occur in October of 2014, but was postponed by the USFWS as they gathered additional data related to the projected spread of White Nose Syndrome (WNS) in the range of the northern long-eared bat. A listing decision is now anticipated on April 2, 2015. Additional information about these four species is provided below.

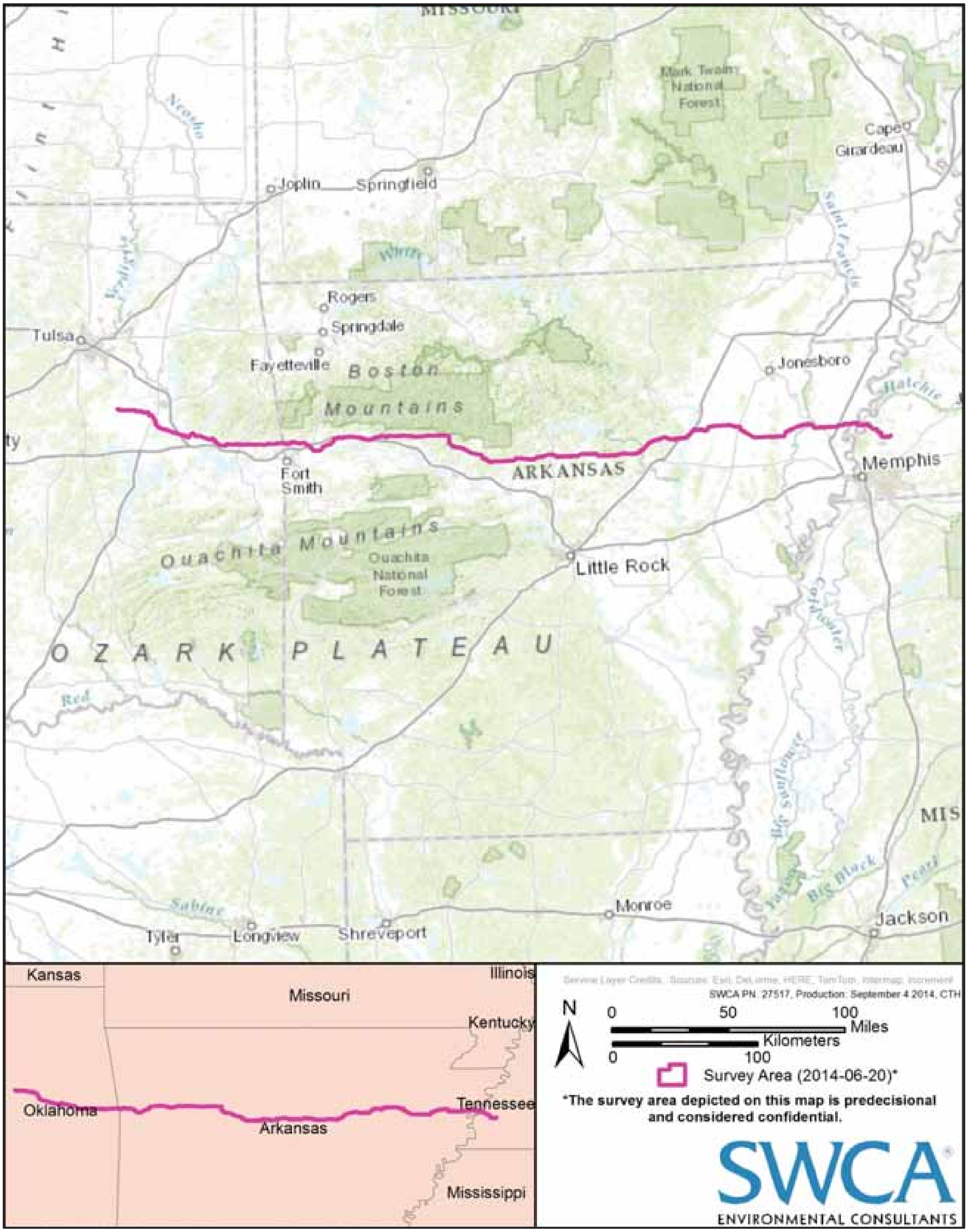

Figure 1. Location of the Plains & Eastern bat habitat study area.

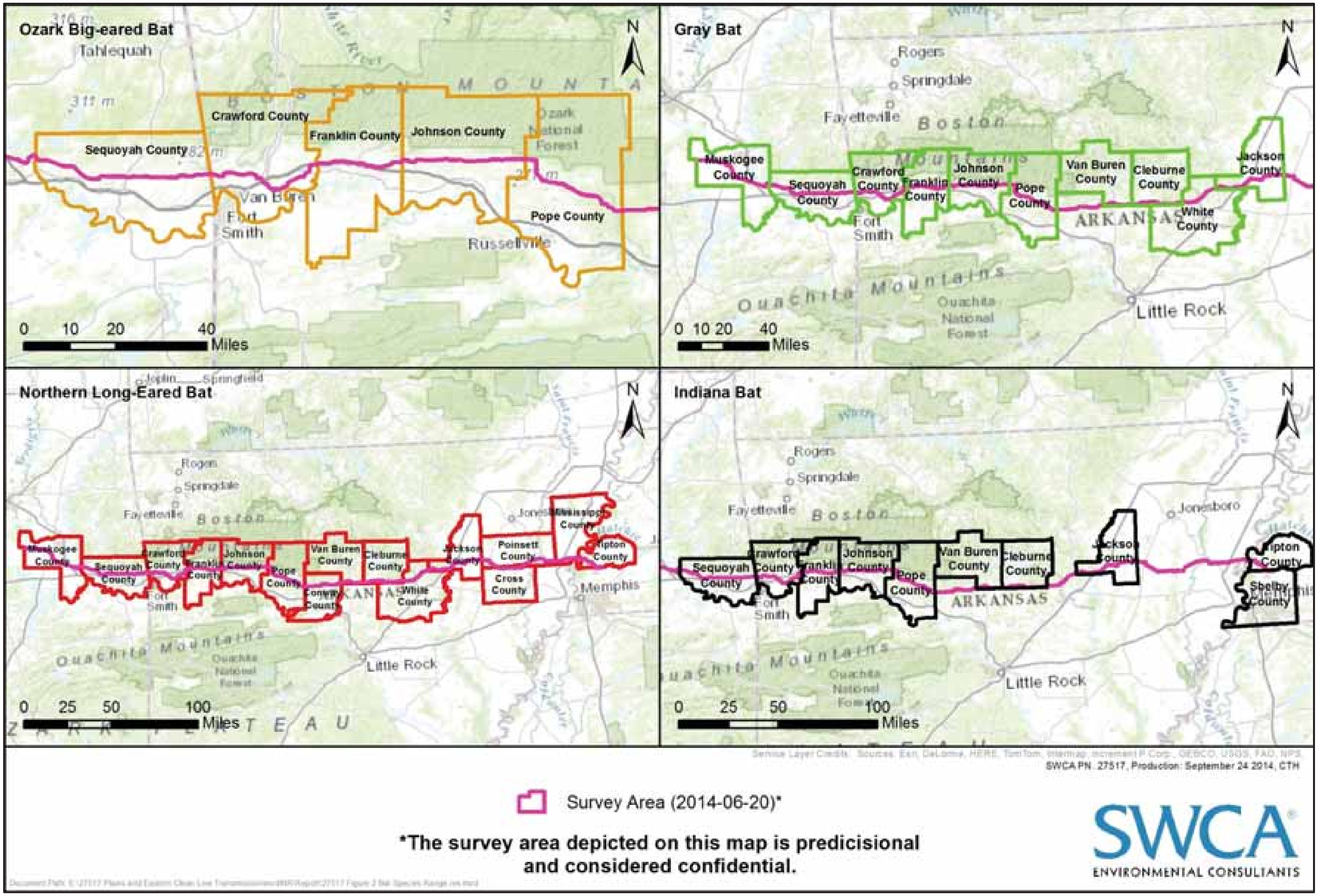

Figure 2. Counties crossed by the project with known or potential occurrence of four focal bat species.

1.2.1 Indiana Bat

The Indiana bat (listed *Endangered*) is a small migratory bat of the eastern and central United States. Indiana bats hibernate in caves and mines during the winter and emerge in the spring and summer months to distribute across the landscape, using forested areas to feed, breed, and shelter, before returning to hibernation sites (hibernacula) in the fall. The summer distribution of the Indiana bat covers much of the eastern United States, while the winter range is reduced and is generally associated with limestone caves and karst areas in Indiana, Kentucky, and Missouri (USFWS 2006, Menzel et al. 2001). Indiana bats tend to arrive at hibernacula from mid-August through October and emerge from hibernacula from mid-April through May after approximately 190 days of hibernation (Menzel et al. 2001). In summer, forested areas that contain trees with cavities, cracks, crevices, or exfoliating bark (whether from live trees or dead or dying trees) provide potentially suitable roosting habitat.

Appendix A of the USFWS Revised Range-wide Indiana Bat Summer Survey Guidelines (January 2014) loosely defines summer habitat as the "wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures." Potential summer habitat may also include linear features such as fencerows, riparian forests, and other wooded corridors, as well as individual trees, if they provide characteristics which make the tree suitable for roosting.

In the summer, reproductively mature females form maternity colonies of up to several hundred individuals as a life history strategy to improve reproductive success, while males and non-reproductive females typically roost singly or in small groups (USFWS 2007). While Indiana bats may use a variety of tree species as roosts, most roost trees (87 percent [%]) are ash (*Fraxinus* spp.), elm (*Ulmus* spp.), hickory (*Carya* spp.), maple (*Acer* spp.), poplar (*Populus* spp.), and oak (*Quercus* spp.) species (USFWS 2007).

Caves and mines that are used as hibernacula offer the correct combination of temperature, humidity, cave structure, and air flow to support hibernating colonies of Indiana bats. Very few caves provide suitable conditions and, while they may be used as temporary roosts during the active season, most caves are not suitable hibernacula.

At least one Indiana bat hibernaculum is known to exist in the general vicinity of the study area: Rosson Hollow Crevices, a Priority III hibernaculum in Franklin County, Arkansas, is located approximately 7 mi [11 km] north of the study area (Approximate location shown in Figure 3, geographic ambiguity added to protect the location of the hibernaculum). The 2007 Draft Indiana Bat Recovery Plan identifies additional summer and winter records of the Indiana bat in a number of other counties in the vicinity of the study area.

Page 5 – (Omitted Figure 3)

DISCLAIMER: Upon consultation with the U.S. Fish and Wildlife Service, the publicly released document has been redacted to omit the identified pages which relate to potential species habitats and occurence in order to protect sensitive species from disturbance.

1.2.2 Gray Bat

The gray bat (listed *Endangered*) is a relatively large *Myotis* that is associated with caves and limestone karst regions of the southeastern United States. The range of the gray bat centers on the states of Missouri, Tennessee, and Kentucky, and extends west to eastern Oklahoma and Nebraska. The gray bat lives in caves year-round, migrating between winter caves that are used as hibernacula and summer roost or maternity caves where young are born. Summer caves are often located near rivers, reservoirs, or other large bodies of water over which the insectivorous bats feed.

Like the Indiana bat, gray bat hibernacula provide a specific combination of conditions which make them suitable for bat use. Gray bat hibernacula tend to be deep vertical caves that trap large volumes of cold air. It is estimated that about 95% of the population of gray bats hibernates in only 9 caves, with nearly half the population hibernating in a single cave in Alabama (Brady et al. 1982). Caves used by summering gray bats must be warm or have restricted rooms that can trap the body heat of clustered bats and are typically within 0.6 – 2.5 mi (1 – 4 km) of waterways or reservoirs used as foraging areas (Brady et al. 1982, Tuttle 1976).

1.2.3 Ozark Big-Eared Bat

The Ozark big-eared bat (OBEB; listed *Endangered*) is also a cave-obligate species (USFWS 1995). The range of this bat is very small, restricted to a handful of caves in the Ozark Highlands and Boston Mountains ecoregions of northeastern Oklahoma and northwestern and north-central Arkansas (USFWS 2011). Former populations in southwestern Missouri are now believed to be extirpated.

The caves used by Ozark big-eared bats are located in karst regions dominated by oak-hickory forest. Like gray bats, they move on a seasonal basis between winter hibernacula and summer roosts or maternity caves. However OBEB are not considered migratory. Per the 1995 Ozark Big-Eared Bat Recovery Plan (USFWS 1995) "Maternity colonies are in cooler portions of caves from mid-April to late July. Solitary males usually occur in caves, talus cracks, and cliff overhangs during summer. Both sexes hibernate at cold locations in cold caves during winter months."

1.2.4 Northern Long-Eared Bat

The northern long-eared bat (NLEB; proposed *Endangered*) occupies a similar, though slightly larger, summer range as the Indiana bat, occurring from Maine south to North Carolina, and west into Oklahoma and the Dakotas (USFWS 2013b). Like the Indiana bat, the species also hibernates in caves and mines, and distributes across the landscape during summer months. However in addition to roosting in trees during the summer, the NLEB will sometimes roost in sheds, barns, bridges, and other man-made structures, and will also find summer roosts underground in caves, mines, and rockshelters. As a species only recently proposed for listing, the NLEB lacks the long-term occurrence data and formalized survey guidance maintained by the USFWS for other bat species (such as the Indiana bat).

2.0

2.1

To characterize bat habitat on the study area, SWCA conducted field assessments of forested areas to identify potential roost trees (PRTs) which may be used by summering Indiana bats and/or NLEB.

As the Indiana bat has been a listed species and the subject of intensive research for many decades, the characteristics of typical roosts used by the species are well known. However, less is known about tree roosts used by NLEB. The Proposed Listing Rule for the NLEB as well as the *Northern Long-eared Bat Interim Conference and Planning Guidance* both characterize the NLEB as opportunistic in roost selection, using a wide variety of tree species, both living and dead, as roosts (USFWS 2013a, USFWS 2014). The species also appears to prefer cavities to exfoliating bark, and roosts in the forest interior more frequently than the Indiana bat. NLEB are also occasionally found roosting in structures like barns and sheds (particularly when suitable tree roosts are unavailable).

The *Northern Long-eared Bat Interim Conference and Planning Guidance* states that most roost trees used by NLEB have a diameter at breast height (dbh) of 3 inches (in; 7.6 centimeters [cm]) or greater (USFWS 2014). However the documented average roost size appears to be larger, as presented in a series of studies and literature reviews:

Average tree roost dbh used by NLEB:

- 16.9 in (43 cm +/- 2.3 cm) Timpone *et al*. (2010)
- 14.6 in (37 cm +/- 4.7 cm) Carter and Feldhamer (2005)
- 24.8 in (63 cm +/- 6.0 cm) Foster and Kurta (1999)
- 11.8 in (30 cm +/- 5.4 cm) Lacki *et al.* (2009; literature summary)

Indiana bats appear to preferentially roost in larger-diameter trees, both for primary maternity roosts, and alternate roosts. Lacki et al. (2009) reviewed and summarized a variety of publications on Indiana bat roost sizes, and found an average of 16.3 in (41.4 cm). The 2007 *Draft Indiana Bat Recovery Plan* (USFWS 2007) and sources cited therein note that roost trees vary widely in size. However the 2014 Revised Range-Wide Indiana Bat Summer Survey Guidelines (available at http://www.fws.gov/midwest/Endangered/mammals/inba/surveys/pdf/2014IBatSummerSurveyGuidelines13Jan2014.pdf) state that while small-diameter trees (<5 in [12.7 cm]) may be used by foraging bats, such early-successional habitats do not generally constitute suitable roosting habitat.

Thus, for the purposes of this assessment, to maximally capture size classes of PRTs for both the Indiana bat and NLEB, PRTs are defined as any tree, living or dead, with the following characteristics: dbh of 8 in (20.3 cm) or greater, with exfoliating, peeling, or loose bark, split trunks and/or branches, or cavities. Trees were excluded which were covered in vines or other choking vegetation which would preclude use of the tree by bats. Snags with no exfoliating bark or discernible cracks, cavities, or holes (e.g., bare poles) were also excluded.

During field assessments, SWCA biologists and technicians walked the study area in teams of two to three, and identified all PRTs within the 300-ft survey corridor, within portions of the study area where survey access was granted. The geographic location of each PRT was recorded using a Trimble GeoXH real-time differentially corrected global positioning system (GPS) unit with sub-meter accuracy. Each PRT was photographed, and a data sheet was completed noting both the characteristics of the tree and general notes regarding the surrounding habitat(s).

2.2

Concurrent with identification of PRTs within the study area, SWCA also surveyed the study area for the presence of subterranean features which may be used as hibernacula by Indiana bats or NLEB, or as roosts or hibernacula by gray bats or OBEB. As described by the project study plan, SWCA searched the project area for caves, sinkholes, losing streams, springs, or other topographical features indicative of the presence of karst influence.

Winter bat habitat/potential hibernacula features are defined for the purposes of this survey as a cave, sinkhole, rockshelter, or other karst feature or opening which may be used by OBEB, gray bats, Indiana bats, or NLEB as roosts or hibernacula.

With some exceptions, openings were excluded when:

- There is only one horizontal opening less than 6 in (15.2 cm) in diameter and no or very little airflow is detected.
- The opening is a vertical shaft <1 ft (0.3 m) in diameter. The opening is a passage that continues less than 50 ft (15.2 m) and terminates with no fissures that bats can access.
- The opening appears prone to flooding, collapsed shut and completely sealed, or otherwise inaccessible to bats.
- The opening appears to have occurred recently (within 1 year) due to subsidence.

Each feature meeting this definition that was located within the 300-ft (91.4 m) survey corridor was assessed, photographed, and the location recorded with GPS. Data sheets noting characteristics of the feature, as well as the surrounding habitat(s), were also completed.

Due to concerns about potential transmission of WNS and safety concerns SWCA did not enter any significant feature or approach large vertical openings. Features were thoroughly assessed from a safe distance. Flashlights were used to determine the approximate depth and interior characteristics of features.

3.0 RESULTS

3.1

From June 23 through July 12, 2014, and again from July 28 through August 15, 2014, SWCA mobilized a team of biologists and technicians to the study area to assess bat habitat. Surveys were conducted within tracts where survey access was granted by the landowner. Most tracts where survey access was not granted, but where adjacent tracts provided a clear view of the property, were surveyed and cleared from adjacent tracts. In total, SWCA surveyed approximately 140 miles of the study area, representing 84% of the available (accessible, or able to be surveyed from public roads or adjacent properties) tracts (Table 1). SWCA surveyed about 37% of the 373 total miles of study area (both accessible and inaccessible tracts) (Table 2).

In portions of the survey area where the potential to encounter karst terrain, caves, mines, or other potential winter habitat was thought to be high (e.g., eastern Oklahoma and western Arkansas), SWCA conducted a 100% survey of accessible tracts, walking the entire survey area. As the teams moved east out of the karst zone (Figure 4) and into flatter farmlands near the Mississippi River (e.g., eastern Arkansas and Tennessee), SWCA focused surveys on forested areas where potential summer habitat (PRTs) could potentially occur. Tracts which were confirmed to be totally in agricultural/row crop development were not considered for survey.

Habitats and landcover characteristics of each county surveyed during this effort are described below (Figure 5). Ecoregions are delineated and described according to the U.S. Department of Agriculture (USDA) U.S. Forest Service Ecological Subregions layer in ArcMap ™ and USDA (1994). A list of the most commonly encountered tree canopy species is provided in Table 3.

Table 1. Linear Miles of Available Survey Area by County

County	Available Miles	Miles Surveyed	Percent
Muskogee	32.57	32.57	100
Sequoyah	17.49	16.60	95
Crawford	9.84	9.63	98
Franklin	7.85	6.56	84
Johnson	15.31	15.31	100
Pope	10.94	10.64	97
Conway	8.27	6.17	75
Van Buren	5.67	1.15	20
Cleburne	10.76	8.50	79
White	8.90	7.10	80
Jackson	7.07	3.42	48
Poinsett	11.07	4.31	39
Cross	7.24	4.56	63
Mississippi	3.38	2.35	70
Tipton	8.04	7.77	97
Shelby	2.28	2.28	100
Total	**166.69**	**139.77**	**83.85**

Table 2. Linear Miles of Total Survey Area by County

County	Total Miles	Miles Surveyed	Percent
Muskogee	39.52	32.57	82
Sequoyah	40.05	16.60	41
Crawford	28.54	9.63	34
Franklin	19.89	6.56	33
Johnson	27.94	15.31	55
Pope	27.37	10.64	39
Conway	21.70	6.17	28
Van Buren	13.28	1.15	9
Cleburne	23.57	8.50	36
White	17.26	7.10	41
Jackson	33.80	3.42	10
Poinsett	31.56	4.31	14
Cross	16.15	4.56	28
Mississippi	16.51	2.35	14
Tipton	11.28	7.77	69
Shelby	4.89	2.28	47
Total	**373.3**	**139.77**	**37.44**

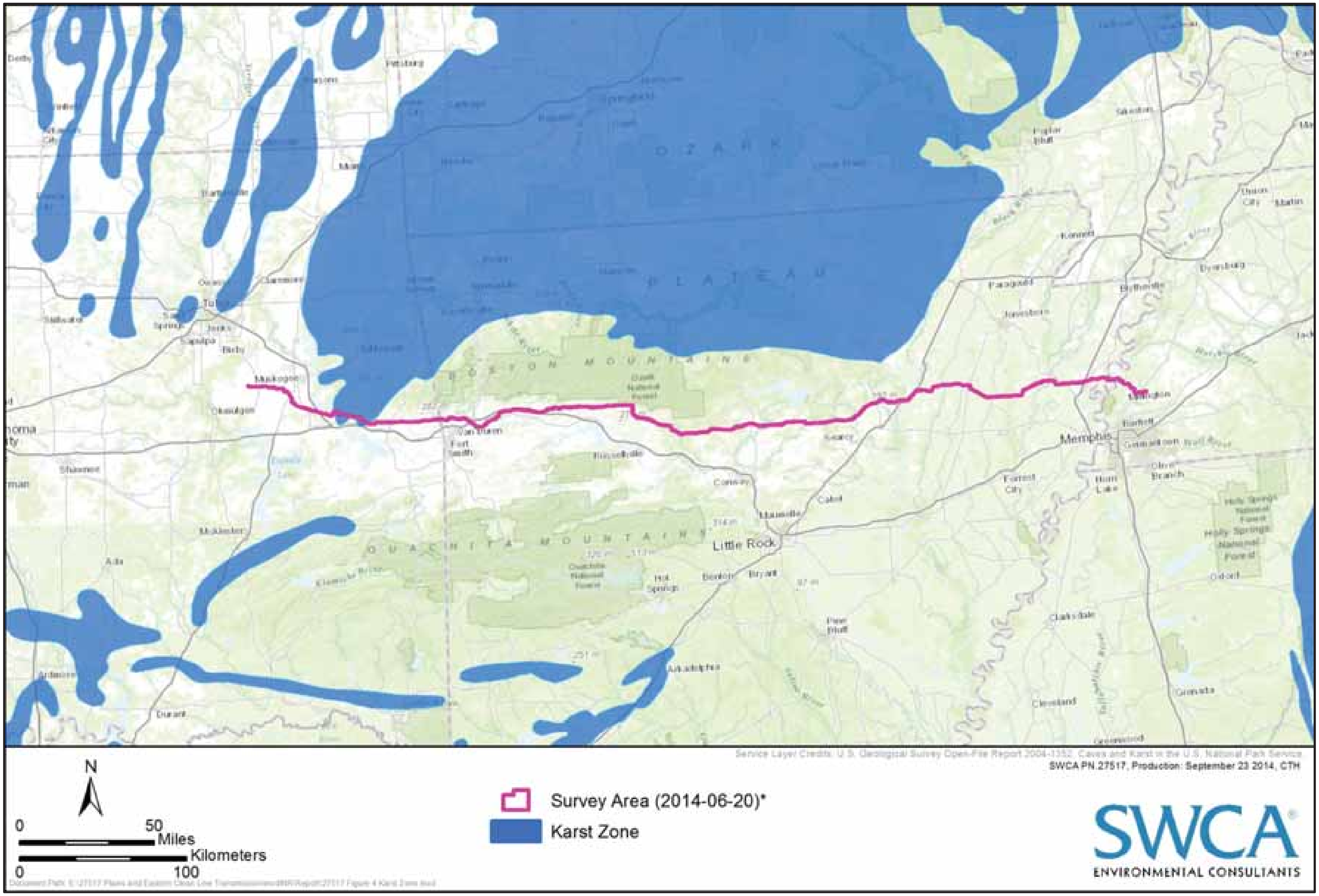

Figure 4. Survey area in relation to Karst zones.

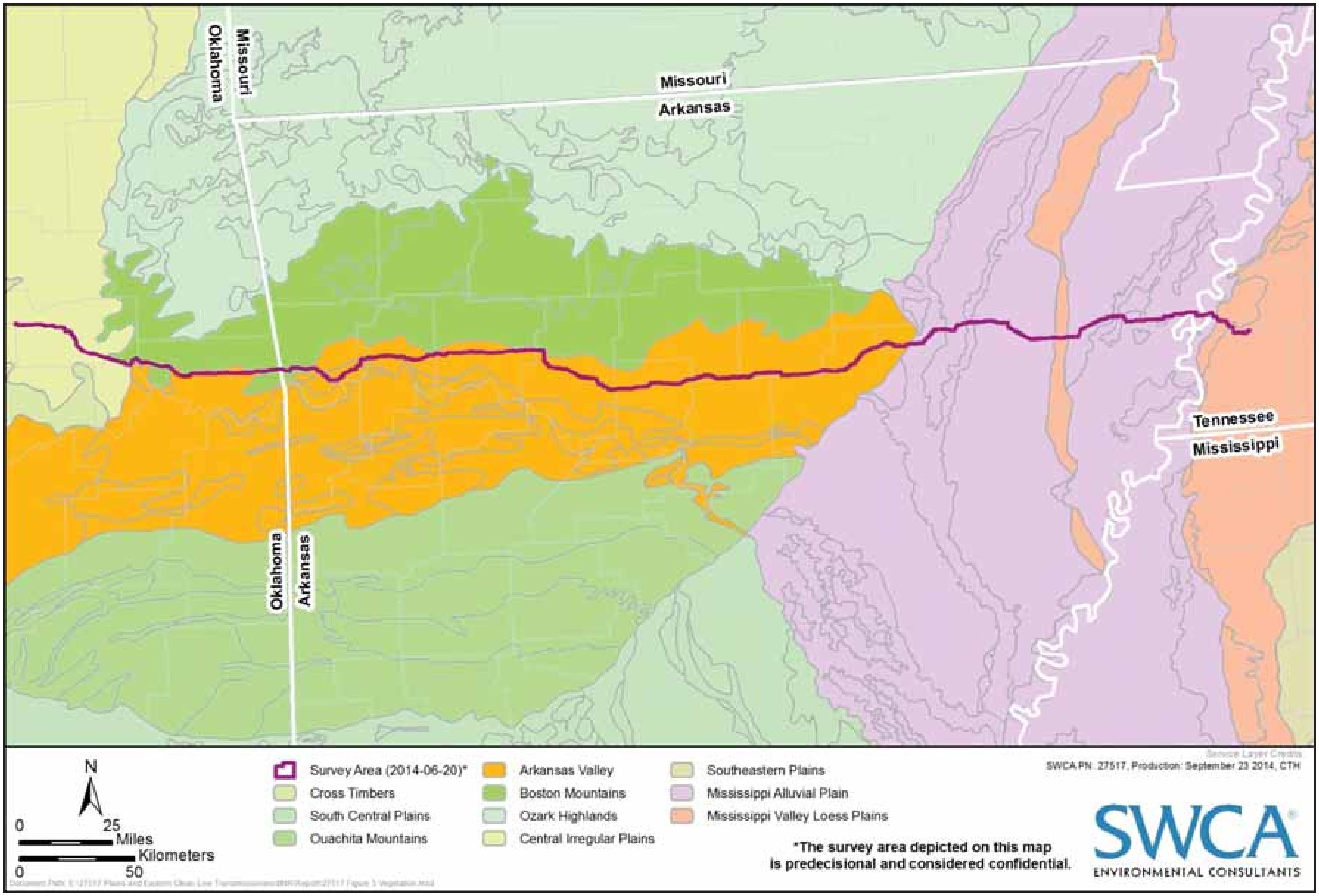

Figure 5. Ecoregions of the Plains & Eastern study area.

Table 3. Overstory Species Observed

Scientific Name	Common Name
Acer negundo	Boxelder
Acer rubrum	Red Maple
Acer saccharinum	White Maple
Aesculus glabra	Ohio Buckeye
Ailanthus altissima	Tree of Heaven
Amelanchier arborea	Common Serviceberry
Broussonetia papyrifera	Paper Mulberry
Carya cordiformis	Bitternut Hickory
Carya illinoinensis	Pecan
Carya ovata	Shagbark Hickory
Carya texana	Black Hickory
Carya tomentosa	Mockernut Hickory
Celtis laevigata	Sugarberry
Cercis canadensis	Eastern Redbud
Cornus florida	Flowering Dogwood
Diospyros virginiana	Eastern Persimmon
Fraxinus pennsyvanica	Green Ash
Gleditsia triacanthos	Honey Locust
Juglans microcarpa	Little Walnut
Juglans nigra	Black Walnut
Juniperus virginiana	Eastern Red Cedar
Liquidamber styraciflua	Sweetgum
Maclura pomifera	Osage Orange
Morus alba	White Mulberry
Morus rubra	Red Mulberry
Nyssa aquatic	Water Tupelo
Nyssa sylvatica	Black Tupelo
Pinus echinata	Shortleaf Pine
Pinus taeda	Loblolly Pine
Platanus occidentalis	Sycamore
Poncirus trifoliata	Hardy Orange
Prunus serotina	Black Cherry
Quercus alba	White Oak
Quercus falcata	Southern Red Oak
Quercus imbricaria	Shingle Oak
Quercus macrocarpa	Bur Oak
Quercus marilandica	Blackjack Oak
Quercus muehlenbergii	Chinquapin oak
Quercus nigra	Water Oak
Quercus palustris	Pin Oak
Quercus rubra	Red Oak
Quercus shumardii	Shumard Oak
Quercus stellata	Post Oak
Quercus velutina	Black Oak
Robinia pseudoacacia	Black Locust
Salix nigra	Black Willow
Sapindus saponaria	Soapberry
Tilia caroliniana	Basswood
Ulmus alata	Winged Elm
Ulmus americana	American Elm
Ulmus crassifolia	Cedar Elm
Ulmus rubra	Red Elm / Slippery Elm
Zanthoxylum clava-herculis	Hercules' Club

Muskogee County, OK

The majority of western Muskogee County lies within the Cross Timbers-Cherokee Prairie ecosystem and is relatively flat with an estimated 75% of the land being used for agriculture. Cattle production and hay fields comprise the majority of the land use by human beings. Riparian areas and drainages are often the only locations where trees dominate and narrow woodlots can follow these regions for many miles. What little area has been allowed to reforest is typically characterized with small-diameter trees (less than 10 in [25 cm] dbh).

The landscape gradually becomes hilly in the eastern portion of the county until large tracts of uncut forest replace the agriculture fields and the natural ecosystem is classified as Boston Hill. Land elevation near the Arkansas River changes very rapidly and the hills get much larger. Steep hills and valleys are common. The trees in this region are generally larger (greater than 15 in [38 cm] dbh) and are spaced relatively far apart.

Kuchler (1964) characterized vegetation in the both the Cross Timbers-Cherokee Prairie and Boston Hills ecoregions as oak-hickory forest and oak-hickory-pine forest.

Sequoyah County, OK

The study area in Sequoya County follows a meandering ecosystem boundary that separates the Boston Hill ecoregion and Western Arkansas Valley and Ridges ecoregion. This hilly region follows a patchwork mosaic of the two ecosystems and is very rural.

Locations where the survey corridor encounters the Boston Hills are often forested and contain timber that is dominated by large-diameter (greater than 15 in [38 cm] dbh) trees and few vines. The landscape can play host to dramatic elevation changes and the hills and valleys can become very steep; thus preventing large-scale agriculture.

Segments of the study area that course through the Western Arkansas Valley and Ridges ecosystem can also experience steep hillsides, however these dramatic swings in elevation are not as common. This region is more likely to have been converted to agricultural use; though there are still large tracts of large trees following drainages.

Vegetation in this county is characterized by Kuchler (1964) as oak-hickory forest, oak-hickory-pine forest, cross timbers (oak-bluestem [*Andropogon* spp.]), and southern floodplains forest.

Crawford County, AR

The study area passes into western Arkansas through the Boston Hills ecosystem, then continues through the easternmost portion of the Western Arkansas Valley and Ridges ecosystem and finally enters the Eastern Arkansas Valley and Ridges near the eastern border of the county. Crawford County is more developed than Sequoyah County in terms of both urban development and agricultural development.

As with other parts of the project area, the survey corridor passing through the western portion of Crawford County is thickly forested with large-diameter trees that scale large hills and valleys. East of the town of Van Buren, the landscape becomes less hilly as it enters the Western Arkansas Valley and Ridges ecosystem and agricultural activity dominates the landscape. Woodlots are common along drainages, however these forested areas are often characterized by smaller trees that are covered in vines. A very similar landscape is found in the eastern portion of the county as the survey corridor enters the Eastern Arkansas Valley and Ridges ecosystem.

Kuchler (1964) mapped vegetation in the Boston Hills area as oak-hickory forest and oak-hickory-pine forest, and the vegetation within the Arkansas Valley ecotype as oak-hickory forest, oak-hickory-pine forest, cross timbers, and southern floodplains forest.

Franklin County, AR

The study area parallels Interstate 40 through much of Franklin County and passes through a landscape dominated by agriculture; though large swaths of forest continue to punctuate the study area. The entire county is classified as the Eastern Arkansas Valley and Ridges ecosystem with rolling hills and fewer steep escarpments than were observed in the Boston Hills ecoregion.

Kuchler (1964) mapped the vegetation within the Arkansas Valley ecotype as oak-hickory forest, oak-hickory-pine forest, cross timbers, and southern floodplains forest.

Johnson County, AR

The study area diverges from the Interstate 40 alignment and continues across the Eastern Arkansas Valley and Ridges ecoregion with a description similar to that of Franklin County. Most of the project area continues to be dominated by agriculture mixed with large areas of forest.

Vegetation within the Arkansas Valley ecotype is mapped as oak-hickory forest, oak-hickory-pine forest, cross timbers, and southern floodplains forest (Kuchler 1964).

Pope County, AR

The study area continues across the Eastern Arkansas Valley and Ridges ecoregion with a description similar to that of Franklin and Johnson counties. In this county most of the study area continues to be dominated by agriculture mixed with large areas of forest.

Kuchler (1964) mapped the vegetation within the Arkansas Valley ecotype as oak-hickory forest, oak-hickory-pine forest, cross timbers, and southern floodplains forest.

Conway County, AR

The study area continues along its trajectory through the Eastern Arkansas Valley and Ridges ecoregion as it passes through Conway County. The survey corridor in the eastern half of the county passes through a relatively flat region dominated by agricultural fields; while much of the western half of the county is dominated by hills and forested regions. This is a very rural region with very little urban development. The whole county is classified as Eastern Arkansas Ridges and Valleys ecotype, which is a subsection of the Arkansas Valley ecotype.

Kuchler (1964) mapped the vegetation within the Arkansas Valley ecotype as oak-hickory forest, oak-hickory-pine forest, cross timbers, and southern floodplains forest.

Van Buren County, AR

The study area continues along the very southernmost portion of Van Buren County as it weaves around the towns of Damascus and Gravesville. Several moderately sized rivers cross the right-of-way and the landscape is dominated by a patchwork of cleared agricultural fields and contiguous forest. The whole county is classified as Eastern Arkansas Ridges and Valleys ecotype, which is a subsection of the Arkansas Valley ecotype.

Kuchler (1964) mapped the vegetation within the Arkansas Valley ecotype as oak-hickory forest, oak-hickory-pine forest, cross timbers, and southern floodplains forest.

Cleburne County, AR

The study area parallels the southern border of Cleburne County and skirts just south of the town of Quitman. The western half of the county is mainly characterized by cleared agriculture fields. The eastern half of the county achieves greater elevation and becomes hillier. This area is dominated by hills and valleys with contiguous forest and little human development. The whole county is classified as Eastern Arkansas Ridges and Valleys ecotype, which is a subsection of the Arkansas Valley ecotype.

Kuchler (1964) mapped the vegetation within the Arkansas Valley ecotype as oak-hickory forest, oak-hickory-pine forest, cross timbers, and southern floodplains forest.

White County, AR

The study area avoids the developed regions to the south by traveling north and east; through the town of Letona, which lies just south of the survey corridor near the western border of the county. Cleared agriculture fields dominate the landscape, though large swaths of forest surround several large drainages that cross the survey corridor. The western half of White County classified as Eastern Arkansas Ridges and Valleys, while the eastern half is classified as Boston Hills.

Kuchler (1964) mapped the vegetation within the Arkansas Valley ecotype as oak-hickory forest, oak-hickory-pine forest, cross timbers, and southern floodplains forest. Kuchler (1964) mapped the Boston Hills area as oak-hickory forest and oak-hickory-pine forest. There is a high density of small- to medium-size perennial streams and associated rivers; those in intermountain basins have moderate rates of flow, and some on mountain sides are characterized by high rates of flow and velocity.

Jackson County, AR

The western panhandle continues to be hilly and highly incised due to activity from rivers and streams. As such, this portion of the county is dominated by forests; though there are some areas that have been cleared for agriculture. The landscape then transitions into a flat, alluvial floodplain as the study area travels east; through the middle of the county. This region is almost entirely devoid of forested areas; with the only exceptions being the immediate vicinity along drainages. The western half of the county is classified as Boston Hills, which transitions to the White and Black Rivers Alluvial Plains section.

Kuchler (1964) mapped the Boston Hills area as oak-hickory forest and oak-hickory-pine forest. There is a high density of small- to medium-size perennial streams and associated rivers. McNab et al. (2005) mapped the White and Black Rivers Alluvial Plain section as being flat, weakly to moderately dissected alluvial plain formed by deposition of continental sediments. Much of the natural vegetation has been cleared for cultivation; small areas remain of oak-gum-cypress and oak-hickory cover types.

Poinsett County, AR

The study area clips the southwestern and southeastern corners of Poinsett County. This part of the county is very rural with very little urbanization and almost no forest. The whole region is entirely devoted to farming and has been cleared of most timber. The survey corridor does get close to the small towns of Marked Tree and Tyronza in the southeast part of the county and passes through several ecotypes. These include the White and Black Rivers Alluvial Plain, Crowley's Ridge, the St. Francis River Alluvial Plain and the North Mississippi River Alluvial Plain. All of these are subcategories of the White and Black Rivers Alluvial Plain section.

McNab et al. (2005) mapped the White and Black Rivers Alluvial Plains as being flat, weakly to moderately dissected alluvial plain formed by deposition of continental sediments. Much of the natural vegetation has been cleared for cultivation; small areas remain of oak-gum-cypress and oak-hickory cover types.

Cross County, AR

The survey corridor dips down into a small portion of north central Cross County. Much of this region is characterized by a landscape dominated by agriculture with no urbanization. However, a large uplift of land creates a highly incised ridge approximately 4.25 miles wide. This uplift is a mosaic of forest and cleared landscape primarily used for agriculture. The survey corridor passes through Crowley's Ridge and the St. Francis River Alluvial Plain ecotypes; both of which are subcategories of the White and Black Rivers Alluvial Plain section.

McNab et al. (2005) mapped the White and Black Rivers Alluvial Plains as being flat, weakly to moderately dissected alluvial plain formed by deposition of continental sediments. Much of the natural vegetation has been cleared for cultivation; small areas remain of oak-gum-cypress and oak-hickory cover types.

Mississippi County, AR

The study area in Mississippi County has been heavily impacted by agricultural practices, with very little timber remaining. The region is flat and has been cleared for farming, with some pockets of trees remaining immediately adjacent to drainages. The survey corridor is not impacted by urban development; however the Mississippi River is on the eastern border of the county. The ecotype is characterized as North Mississippi River Alluvial Plain, which is a subcategory of the White and Black River Alluvial Plain section.

McNab et al. (2005) mapped the White and Black Rivers Alluvial Plains as being a flat, weakly to moderately dissected alluvial plain formed by deposition of continental sediments. Much of the natural vegetation has been cleared for cultivation; small areas remain of oak-gum-cypress and oak-hickory cover types.

Tipton County, TN

The study area traverses the Mississippi River, which forms the western boundary of Tipton County. The study corridor then moves across the southwestern corner of the county, across cleared fields and into a region characterized by hills and bluffs with drainage incisions. While remaining rural, the larger hills are less developed for agriculture and large stands of contiguous forest occur here. The land flattens out somewhat in the southernmost part of the county and agricultural clearing again dominates the landscape. The predominant ecotype is characterized as Deep Loess Hills and Bluffs, which is a subcategory of the Coastal Plains-Loess section.

McNab et al. (2005) mapped the Coastal Plains-Loess section as consisting of irregular plains and gently rolling hills, with steep bluffs near the Mississippi River. Wind-deposited, deep, fine-textured loess soils of varying thickness are distinctive for this subregion. Forest vegetation is oak-pine, loblolly-shortleaf pine, oak-hickory, and oak-gum-cypress cover types.

Shelby County, TN

The study area dips into Shelby County for approximately 4 miles before turning north and terminating after a short distance in Tipton County. The survey corridor in Shelby County is a mosaic of agricultural fields and timber stands; with the trees achieving maximum concentration over a small region of larger hills. Some urban development is present in this location, though with very sparse density. The predominant ecotype is characterized as Deep Loess Hills and Bluffs, which is a subcategory of the Coastal Plains-Loess section.

McNab et al. (2005) mapped the Coastal Plains-Loess section as consisting of irregular plains and gently rolling hills, with steep bluffs near the Mississippi River. Wind-deposited, deep, fine-textured loess soils of varying thickness are distinctive for this subregion. Forest vegetation is oak-pine, loblolly-shortleaf pine, oak-hickory, and oak-gum-cypress cover types.

3.2

A total of 304 PRTs were identified during the first mobilization, and 306 PRTs were identified during the second mobilization (total of 610 PRTs). Of these 610 PRTs, 205 (about 37%) were living trees and 405 (about 66%) were snags. Appendix A contains a table describing details of all 610 PRTs identified during the field survey. Appendix B contains maps showing the distribution of PRTs across the study area. Distribution of PRTs by county is provided in Table 4. Appendix C contains a photographic log of PRTs, and Appendix D contains scanned copies of all field data forms for each PRT.

Table 4. Number of Potential Roost Trees (PRTs) by County, and Percent of Total Represented by Each County.

County Name, State (County acronym)	Number of PRTs	Percent of Total	Miles Surveyed	Average PRTs per Mile
Muskogee, OK (MU)	125	20.5	32.57	3.8
Sequoyah, OK (SE)	137	22.5	16.60	8.3
Crawford, AR (CR)	37	6.1	9.63	3.8
Franklin, AR (FR)	24	3.9	6.56	3.7
Johnson, AR (JO)	90	14.8	15.31	5.9
Pope, AR (PO)	41	6.7	10.64	3.9
Conway, AR (CO)	30	4.9	6.17	4.9
Van Buren, AR (VA)	5	0.8	1.15	4.3
Cleburne, AR (CL)	43	7.0	8.50	5.1
White, AR (WH)	41	6.7	7.10	5.8
Jackson, AR (JA)	26	4.3	3.42	7.6
Poinsett, AR (PN)	2	0.3	4.31	0.5
Cross, AR (CS)	1	0.2	4.56	0.2
Mississippi, AR (MI)	2	0.3	2.35	0.9
Tipton, TN (TI)	2	0.3	7.77	0.3
Shelby, TN (SH)	4	0.7	2.28	1.8
Total	**304**	**100**	**139.77**	

Of the 205 living trees identified as PRTs, 81 (about 40%) were various oaks, and 34 (about 17%) were white oaks (*Q. alba*). The next most common living PRTs were various hickories, with 39 PRTs identified (19% of the total). Average estimated dbh of all PRTs was 18.6 in (47.2 cm), and average estimated height of all PRTs was 37.7 ft (11.5 m). Close to half (43%) of the PRTs were located in the two Oklahoma counties (Muskogee and Sequoyah).

3.3

3.3.1 Initial Observations

During the first mobilization (June 23–July 12), 20 karst features were identified: two in Sequoyah County, OK; 15 in Crawford County, AR; two in Franklin County, AR; and one in Pope County, AR (Table 5). All 20 features were horizontal rockshelters, ranging from 7 to 200 ft (2 to 61 m) in length and none deeper than 30 ft (9.1 m) (19 of 20 were 15 ft [4.5 m] deep or less). Guano/scat was observed at three of them. None had detectible air movement.

During the second mobilization (July 28–August 15), an additional 10 karst features were identified; one in Sequoyah County, OK, one in Cleburne County, AR, and eight in White County, AR (see Table 5). Six of the 10 features were cracks in a bluff or cliff, two were horizontal openings, one was identified as a rockshelter and one as a vertical opening. Two had discernible air movement (air flowing out) and biologists observed movement of an unidentified small creature (possible rodent) within one of the features. The depth of several features was indeterminate, as the features were cracks in a cliff or bluff and the back of the feature could not be located. Of the features which could be fully assessed, the deepest was estimated at 20 ft (6.1 m) deep.

Appendix B contains maps showing the distribution of karst features across the study area. Appendix C contains a photographic log of all karst features, Appendix D contains scanned copies of all field data forms for each karst feature, and Appendix E contains additional photographs of reevaluated karst features.

3.3.2 Re-Evaluation of Select Features

During the first mobilization (June 23–July 12), the 20 karst features that were identified were all horizontal rockshelters, ranging from 7 ft to 200 ft (2 to 61 m) in length and most no deeper than 15 ft (4.5 m). During the initial survey, none of the features appeared deep enough to be considered "caves" and none had detectible air movement. However during the re-evaluation, one feature (AR-CR-KAR-062514-004) was found to include an additional small opening deep enough to be considered a cave (estimated at 30 ft deep). Several features contained collections of rodent and other scat, including potential bat guano.

These 20 features are within the range of all four subject bat species, and Graening et al. (2011) identified a number of OBEB occurrences in the general vicinity of the study area, particularly in Adair, Cherokee, and Sequoyah counties, OK, and Washington, Crawford, and Franklin counties, AR. The current study area crosses just south of the foraging distance buffer (about 4 mi [6.4 km]) applied to these occurrence records but is within the larger "potential dispersion" range applied to these records. While there are not necessarily capture records for gray bat, Indiana bat, and/or NLEB in all of the counties where we identified karst features, these species are known to occur in the region (see latest distribution information for all four species at NatureServe Explorer (NatureServe 2014).

Bats will use a variety of karst features as roosts (either temporary roosts during nightly or seasonal movements) or as hibernacula or maternity sites. Graening et al. (2011) identified all of the essential OBEB sites (maternity sites and hibernacula) as either limestone or sandstone caves, and the Ozark Big-Eared Bat Recovery Plan (USFWS 1995) notes that both limestone and sandstone formations are used in Crawford and Franklin counties, Arkansas. Features such as those we identified during our survey do not appear to provide the necessary conditions to be used as significant hibernacula or maternity roosts, but some could be used as temporary roosts. OBEB are known to use a wide variety of sites as roosts, including "sites that are nothing more than a pile of large sandstone slabs with a partially darkened area under them" (USFWS 1995). Clark (1991) observed individual males roosting in various caves, talus cracks, and cliff overhangs. Because of this possibility, SWCA selected seven of the 20 sites identified during the first mobilization for re-evaluation by bat biologist Melanie Gregory. These seven sites were selected because of the size, presence of deeper cracks or crevices, or presence of guano/scat (Table 6). None of the 10 sites identified during the second mobilization have been re-evaluated to date.

Photographs of all karst features are provided in Appendix C, and additional photographs of re-evaluated features are provided in Appendix E.

Table 6. Potential Winter Habitat Features Selected for Re-evaluation

Feature ID	County, State
AR-CR-KAR-062514-002	Crawford, AR
AR-CR-KAR-062514-003	Crawford, AR
AR-CR-KAR-062514-004	Crawford, AR
AR-CR-KAR-062614-011	Crawford, AR
AR-CR-KAR-062914-004	Crawford, AR
AR-FR-KAR-070514-003	Franklin, AR
AR-FR-KAR-070514-005	Franklin, AR

Features AR-CR-KAR-062514-002, -003, and -004 are all part of the same larger feature that runs roughly east to west along the study area, making up a stairstepped series of bluffs, overhangs, and talus slopes leading from the top of a hill down toward a body of water in the valley below (Figure 6). The larger feature is within, and opens out into a mixed-age oak-hickory forest. Outcroppings in the larger feature have many vertical cracks (some appearing to be very deep) as well as horizontal shelves and cracks, and all three sub-features have evidence of rodent use (scat) in some of the larger and lower-to-the-ground cracks. The westernmost feature (AR-CR-KAR-062514-004) includes a narrow cave about 30 ft deep, which curves slightly and ends in a small chamber. The ceiling of the chamber has many small crevices and a small amount of bat guano was identified on rocks around the opening (Appendix E).

None of the three sub-features are large or deep enough to be used as significant hibernacula or maternity roosts, but may be used as day roosts or temporary roosts during nightly movements. The one feature which could be described as a cave does not appear deep enough to provide protection from outside temperature fluctuations, and even at the back of the feature, daylight is clearly visible. There is a possibility that the deeper vertical cracks could extend and open into larger cavities or features which could provide the air traps and stable thermal conditions necessary to support maternity or hibernating colonies. However no air flow was discernible at any of these five sites, no water was flowing in or out, and biologists did not observe any cavities or chambers associated with these cracks.

Feature AR-CR-KAR-062614-011 is a channel of rock that has been undercut by flowing water and collapsed downward to form a small ravine through a mixed-age oak-hickory forest. At the head of the ravine, where seasonal water flow pours into the channel, is a small waterfall and pond (flowing during the first visit, dry during the re-evaluation). Seasonal and storm water flows appear to flood the area periodically and some parts of the feature appear unstable. No bat guano was identified in the feature. The exposed rock along the side of the ravine is undercut in places, and water was dripping from the rocks in several locations. The feature lacked any deeper cracks, crevices or tunnels which might provide shelter to roosting bats, and the apparent flooding—along with dripping water even when the channel is dry—make this feature unlikely to be used by bats.

Feature AR-CR-KAR-062914-004 is a rocky outcropping at the crest of a small hill in oak-hickory forest. There are no significant undercuts, cracks, or crevices which may be used by roosting bats. Rodent use (scat) was evident but no bat guano was observed.

Features AR-FR-KAR-070514-003 and -005 are part of the same larger formation that runs roughly east to west along the study area (see Figure 6). The formation is within, and opens out into, a mixed-age oak-hickory forest. The formation is a large band of outcropped and undercut rock that wraps around a steep hill just below the hill's crest, and it includes many bluffs, walls, cracks, and at least one small rock shelter. A wet-weather drainage bisects the formation, flowing down the hill from above, forming a waterfall over the rock shelter, and continuing downhill below the formation in a rocky channel. There was heavy rain at the time of the second field visit but the stream was not flowing.

Outcroppings in the feature have many vertical cracks (some appearing to be very deep) as well as scattered holes and horizontal shelves/cracks. One very large vertical crack measures from 1 to 2 inches in width, an estimated 25 ft tall, and of an indeterminate depth. Rodent scat was observed at the base of the crack and an ammonia smell was detectable emanating from the crack. A small amount of probable bat guano was observed on rocks outside the crack. Several characteristics of these features, particularly the deep vertical cracks, make them suitable for roosting bats. As with some other features there is a possibility that the deeper vertical cracks could extend and open into larger cavities or features which could support maternity or hibernating colonies. However biologists could not confirm the presence of any cavities or chambers.

Locations of features AR-FR-KAR-070514-003, AR-FR-KAR-070514-005, AR-CR-KAR-062514-003, AR-CR-KAR-062514-002, and AR-CR-KAR-062514-004 are depicted in Figure 6. Based upon re-examination by a bat biologist, these features appear to provide potential roosting habitat for bats.

During the second mobilization (July 28–August 15), an additional 10 karst features were identified though none have been re-evaluated to date. Based upon preliminary review of the feature photographs and data sheets, some of these may warrant additional investigation, particularly those five features where airflow was observed, which contained scat, or where depth of the feature was sufficient or could not be

Page 24 – (Omitted Figure 6)

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determined. These features may warrant further evaluation by a bat biologist to determine the potential for bat use. The five features that appear to warrant additional investigation are

- AR-CL-KAR-083114-021 (discernible air flow, presence of potential guano)
- AR-WH-KAR-080814-001 (deep vertical crack of indeterminate depth)
- AR-WH-KAR-080814-002 (discernible air flow, deep vertical crack of indeterminate depth)
- AR-WH-KAR-080814-004 (deep vertical crack of indeterminate depth)
- AR-WH-KAR-080814-005 (vertical crack estimated at 20 ft deep)

Presence of airflow is indicative of potential connectivity between the feature and other subterranean formations that may be accessible by bats. Deep vertical cracks can provide quality roosting areas and may also lead to deeper openings which may be used by bats. Other features identified during the second mobilization appear to be too small or shallow to provide quality potential roosting habitat.

4.0 CONCLUSIONS

SWCA surveyed approximately 140 miles of the study area, representing 84% of the available tracts (see Table 1) and 37.4% of the entire project (see Table 2). Several counties received a 100% survey of all available tracts, including Muskogee County, OK, Johnson County, AR, and Shelby County, TN. The five western most counties, which appeared to contain the highest concentration of potential bat habitats, received a 97% survey (80.67 out of an available 83.06 miles surveyed).

The counties with the least survey coverage were Jackson County, AR (3.4 out of 7 available miles, or 48% survey), Poinsett County, AR (4.3 out of 11 available miles, or 39% survey) and Van Buren County, AR (1.1 out of about 9 available miles, or 20% survey) due to abundance of agricultural lands and the focusing of survey effort upon available tracts with forest cover.

Potential habitat for all four focal bat species appears to be concentrated at the western end of the study area, in eastern Oklahoma and western Arkansas. Habitats in these areas tended to contain more relief as well as more patches of contiguous forest. As expected, the central and eastern portions of the study area tend to be flatter, more agricultural and with a lower likelihood of containing subterranean features that could be used as roosts or hibernacula. However one pocket of karst features was encountered in north-central White County, Arkansas, in the central portion of the state.

The greatest concentration of PRTs identified within the study area (43% of the total) was located in Muskogee and Sequoyah counties, OK, with an additional 15% located in Franklin County, AR. The five western most counties in the study area contained about 68% of the PRTs identified during this survey, while the five easternmost counties in the study area contained less than 2% of the total PRTs.

Karst features along the study area were most frequently encountered in Crawford County, AR (n=15); followed by White County, AR (n=8), Sequoyah County, OK, Franklin County, AR (n=2), and one feature each in Pope County, AR, and Cleburne County, AR.

Five karst features that were identified during the first mobilization were evaluated a second time and found to provide potential bat roosting habitat, though based upon field evaluation none appear to be deep or large enough to provide air traps or other suitable conditions for hibernation or maternity activities. These features are located in two clusters, one in Franklin County, AR, and one in Crawford County, AR (see Figure 6). An estimated five of the 10 karst features identified in the second mobilization may provide suitable roosting habitat for bats and may warrant further assessment.

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APPENDIX A

TABLE OF POTENTIAL ROOST TREES (PRTs)

Appendix A – (Omitted Pages A-1 to A-15)

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APPENDIX B

MAPS DEPICTING DISTRIBUTION OF FEATURES ACROSS THE STUDY AREA

Maps are searchable using the Find function within Adobe.

Appendix B – (Omitted Map Pages 1-90)

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APPENDIX C:

PHOTOGRAPHIC LOG

Field data forms and photos are organized first by county (west to east) and within each county by date. Both are searchable by feature ID: use Find function and enable "include bookmarks."

Appendix C – (Omitted PhotoLog Pages C1-C374)

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APPENDIX D

FIELD DATA FORMS

Field data forms and photos are organized first by county (west to east) and within each county by date. Both are searchable by feature ID: use Find function and enable "include bookmarks."

Appendix D – (Omitted Data Sheet Pages 1-640)

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APPENDIX E

ADDITIONAL KARST PHOTOGRAPHS

Field data forms and photos are organized first by county (west to east) and within each county by date. Both are searchable by feature ID: use Find function and enable “include bookmarks.”

Appendix E – (Omitted Photo Pages 1-12)

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Appendix E
Re-evaluation of Select Karst Features along the Plains & Eastern Clean Line Transmission Line Project

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SWCA®
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Re-Evaluation of Select Karst Features along the Plains & Eastern Clean Line Transmission Line Project, Oklahoma, Arkansas, and Tennessee

FINAL REPORT

Prepared for

Clean Line Energy Partners LLC

Prepared by

SWCA Environmental Consultants

January 2015

SWCA Project No. 27517.03-AUS

RE-EVALUATION OF SELECT KARST FEATURES ALONG THE PLAINS & EASTERN CLEAN LINE TRANSMISSION LINE PROJECT, OKLAHOMA, ARKANSAS, AND TENNESSEE

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Figure 2. Locations of seven karst features identified during the second mobilization which were assessed and appear to provide potentially suitable bat roosting habitat. 5

APPENDICES

Appendix Photographic Log of Karst Features

1.0 INTRODUCTION AND BACKGROUND

In summer 2014, SWCA Environmental Consultants (SWCA) was contracted by Plains and Eastern Clean Line LLC and Plains and Eastern Clean Line Oklahoma LLC (collectively "Clean Line"), wholly owned subsidiaries of Clean Line Energy Partners LLC (Clean Line or project proponent), to evaluate bat habitat along their proposed Plains & Eastern transmission line project (project). The project is anticipated to follow a linear route stretching from the Oklahoma panhandle east to near Memphis, Tennessee.

Portions of the project are within the range of three species of bat classified as endangered by the Endangered Species Act of 1973 as amended (ESA); the Indiana bat (*Myotis sodalis*), gray bat (*M. grisescens*), and Ozark big-eared bat (OBEB; *Corynorhinus townsendii ingens*), and one species of bat that is currently proposed for listing under the ESA, the northern long-eared bat (NLEB; *M. septentrionalis)*. Clean Line wished to qualitatively determine the presence and distribution of potential bat habitat along the project route to inform the preparation of a project Biological Assessment and other environmental compliance documents.

Clean Line identified the Applicant Proposed Route and defined a 300-foot (ft) (91.4 meter [m]) linear corridor within which they requested bat habitat surveys. This 300-ft (91.4 m) corridor spans the ranges of all four focal bat species, initiating in Muskogee County, Oklahoma, and terminating in Shelby County, Tennessee ("study area"). From June 23 through July 12, 2014, and again from July 28 through August 15, 2014, SWCA mobilized a team of biologists and technicians to the study area to assess bat habitat. The full methods and results of this effort are presented in the SWCA report *Bat Habitat Assessment of the Clean Line Plains & Eastern Transmission Line Project, Oklahoma, Arkansas, and Tennessee* dated September 11, 2014.

During the first mobilization (June 23–July 12), 20 karst features were identified: two in Sequoyah County, OK; 15 in Crawford County, AR; two in Franklin County, AR; and one in Pope County, AR. All 20 features were horizontal rockshelters, ranging from 7 to 200 ft (2 to 61 m) in length and none deeper than 30 ft (9.1 m) (19 of 20 were 15 ft [4.5 m] deep or less). Guano/scat was observed at three of them. None had detectible air movement.

SWCA selected seven of the 20 sites identified during the first mobilization for in-person re-evaluation by bat biologist Melanie Gregory. These seven sites were selected because of the overall size of the feature, presence of deeper cracks or crevices, or presence of guano/scat. Results of the re-evaluation of these seven features are fully described in the September 2014 SWCA report.

During the second mobilization (July 28–August 15), 10 karst features were identified as potentially providing bat habitat; one in Sequoyah County, OK, one in Cleburne County, AR, and eight in White County, AR. Six of the 10 features were cracks in a bluff or cliff, two were horizontal openings, one was identified as a rockshelter and one as a vertical opening. Two had discernible air movement (air flowing out) and biologists observed movement of an unidentified small creature (possible rodent) within one of the features. The depth of several features was indeterminate, as the features were cracks in a cliff or bluff out of view of the biologists, and the back of the feature could not be located. Of the features which could be fully assessed, the deepest was estimated at 20 ft (6.1 m) deep.

As with the first mobilization, SWCA identified eight of the 10 karst features which appeared to warrant additional investigation by a bat biologist. Ms. Gregory visited and evaluated these features on October 15 and 16, 2014, after the September finalization of SWCA's bat habitat assessment report. Thus, the result of the re-evaluation of these eight features is the subject of this addendum to SWCA's September report.

2.0 METHODOLOGY

Methods are identical to those described in the SWCA report *Bat Habitat Assessment of the Clean Line Plains & Eastern Transmission Line Project, Oklahoma, Arkansas, and Tennessee* dated September 11, 2014. During the initial identification of potential bat habitat, SWCA surveyed the study area for the presence of subterranean features which may be used as hibernacula by Indiana bats or NLEB, or as roosts or hibernacula by gray bats or OBEB. As described by the project study plan, SWCA searched the project area for caves, sinkholes, losing streams, springs, or other topographical features indicative of the presence of karst influence.

Each feature meeting this definition that was located within the 300-ft (91.4 m) survey corridor was assessed, photographed, and the location recorded with GPS. Data sheets noting characteristics of the feature, as well as the surrounding habitat(s), were also completed.

Following completion of the initial habitat assessment field work, SWCA bat biologist Melanie Gregory reviewed all feature photographs and data sheets, and identified eight features which warranted additional investigation, particularly features where airflow was observed, which contained scat, or where depth of the feature was deep enough to potentially shelter bats, or where depth of the feature could not be determined. Ms. Gregory and a second biologist then re-visited and evaluated each of the eight features to qualitatively determine each feature's utility to bats and collect additional photographs and information about the feature and surrounding terrain. Due to concerns about potential transmission of White-nose Syndrome (WNS) and safety concerns SWCA did not enter any significant feature or approach large vertical openings. Features were thoroughly assessed from a safe distance. Flashlights were used to determine the approximate depth and interior characteristics of features.

3.0 RESULTS

On October 15 and 16, 2014, SWCA re-visited and evaluated the following eight features, which were initially identified during the second habitat assessment effort, and which were determined to potentially provide suitable bat roosting habitat.

- AR-CL-KAR-083114-021 (discernible air flow, presence of potential guano)
- AR-WH-KAR-080814-001 (deep vertical crack of indeterminate depth)
- AR-WH-KAR-080814-002 (discernible air flow, deep vertical crack of indeterminate depth)
- AR-WH-KAR-080814-003 (crack estimated at 12 ft [3.7 m] tall and 15 ft [4.6 m] deep)
- AR-WH-KAR-080814-004 (deep vertical crack of indeterminate depth)
- AR-WH-KAR-080814-005 (vertical crack estimated at 20 ft [6.1 m] deep)
- AR-WH-KAR-080814-006 (rockshelter estimated at 10 ft [3.0 m] deep)
- AR-WH-KAR-080814-007 (crack estimated at 2 ft [0.6 m] tall and 3.5 ft [1.0 m] deep)

Feature AR-CL-KAR-083114-021 (Figure 1) was visited on October 15. The feature is a small opening measuring about 3 ft (0.9 m) tall by 1 ft (0.3 m) wide and approximately 15 ft (4.6 m) deep. The feature is part of a larger line of outcroppings and bluffs running north-south parallel to a dirt/gravel access road. Though not directly assessed, there appear to be additional features (larger bluffs and rock faces) within the overall formation but outside (to the north) of the 300-ft project survey area.

Page 3 – (Omitted Figure 1)

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This feature is located in moderately dense young forest of small-diameter trees. Overstory species were primarily oak (*Quercus* sp.), elm (*Ulmus* sp.) and eastern red cedar (*Juniperus virginiana*), and the feature is adjacent to a cultivated pine plantation.

Field assessment found the feature to be very wet – recent rains have seeped into and through the feature, and most surfaces were slick with water and algal growth (see the attached photographic log). Air flow which was noted during the initial assessment was not discernible during the second visit, though weather conditions at the time of the second visit were variable and included gusty winds. Rodent scat was observed in and around the feature.

Because the feature appears to be frequently wet and harbor sufficient moisture to support algal growth, it is unlikely to provide appropriate conditions for roosting or hibernating bats. However, like the many rocky outcroppings, bluffs or rockshelters in the area, the feature could be occasionally used by single bats as a short-term temporary or night roost.

Features AR-WH-KAR-080814-001 through 007 (Figure 2) were visited and evaluated on October 16. These features are all part of a very large vertical bluff system with numerous tiered outcroppings, holes, undercuts, and cracks [redacted]. In this area the project study area parallels and is immediately adjacent to (south of) an existing overhead transmission line with a maintained right-of-way. Forest cover in the area includes mixed pines (*Pinus*), oaks, and sweetgum (*Liquidambar styraciflua*). Within and around the bluffs are abundant pine snags and scrub-shrub.

Safe access to the features is an issue as terrain is very steep and there are many areas of unconsolidated ground and vertical drops. The seven named features are the most readily accessible from the top of the bluff complex, [redacted] As such, this grouping of named features, as well as the area immediately surrounding it, should be considered as a whole, as it is difficult to discern where one feature ends and another begins. In addition to the accessible features initially described by SWCA, there appears to be another tier of features farther down the bluffs in an inaccessible area.

The largest directly observable features within this bluff system measure approximately 15 to 20 ft (4.6 to 6.1 m) deep with some cracks appearing to extend deeper. The depth of some features could not be determined due to lack of safe access, or due to the feature being located within the bluff surface overhead. Rodent scat and sign were observed within and around some features, as well as several snake sheds (skins). Photographs of the features, and the surrounding area, are provided in the attached photographic log.

There appears to be a similar system of bluffs [redacted]; this tract [redacted] was not accessible during the initial habitat assessment and has not been surveyed.

The collection of features in White County [redacted] appear to provide potential bat roosting habitat, and some features may be of sufficient size/depth to provide appropriate conditions for hibernating bats or maternity colonies. Additional assessment may be needed to determine if bats are using the features, and in what capacity.

Text Omitted from Page 4

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Page 5 – (Omitted Figure 2)

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4.0 CONCLUSIONS

Bats will use a variety of karst features as roosts (either temporary roosts during nightly or seasonal movements) or as hibernacula or maternity sites. Graening et al. (2011) identified all of the essential OBEB sites (maternity sites and hibernacula) as either limestone or sandstone caves, and the Ozark Big-Eared Bat Recovery Plan (USFWS 1995) notes that both limestone and sandstone formations are used in Crawford and Franklin counties, Arkansas. OBEB are known to use a very wide variety of sites as roosts, including "sites that are nothing more than a pile of large sandstone slabs with a partially darkened area under them" (USFWS 1995). Clark (1991) observed individual males roosting in various caves, talus cracks, and cliff overhangs.

White County, Arkansas is within the potential range of the OBEB and Indiana bat, but neither species is known to occur there, whereas the NLEB and gray bat are both known to occur in White County. Based on SWCA's assessment, the collection of features [redacted] in White County, Arkansas, including the seven named features identified during our survey, may provide the necessary conditions to be used as roosts or hibernacula by NLEB or gray bats. Due to the number of features, their configuration within a sheer bluff complex, and the lack of safe access to many parts of the area, SWCA was not able to investigate all features in-depth, or determine dimensions of all features. No bats or guano were directly observed. To determine bat use of these features, additional surveys such as acoustic surveys may be warranted.

Though it has not been directly surveyed, the bluff complex [redacted] also appears to contain similar geologic features (outcroppings, bluffs, etc.) as those directly observed and assessed [redacted]. If and when survey access is obtained for that tract [redacted] it should also be assessed to determine the presence of potential bat habitats.

Text Omitted from Page 6

DISCLAIMER: Upon consultation with the U.S. Fish and Wildlife Service, redactions have been made to the publicly released document to remove information related to potential species habitats and occurence in order to protect sensitive species from disturbance.

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Clark, B. 5. 1991. Activity Patterns, Habitat Use, and Prey Selection by the Ozark Big-Eared Bat (*Plecotus townsendii ingens*). PhD Dissertation. Oklahoma State University, Stillwater, OK. 80pp.

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APPENDIX

PHOTOPGRAPHIC LOG OF KARST FEATURES

Appendix – (Omitted Photo Pages 1-11)

DISCLAIMER: Upon consultation with the U.S. Fish and Wildlife Service, the publicly released document has been redacted to omit the identified pages which relate to potential species habitats and occurrence in order to protect sensitive species from disturbance.

Appendix F
Lesser Prairie-Chicken Habitat Assessment Report

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Delineation of Potential Habitat for the Lesser Prairie-Chicken along the Plains & Eastern Clean Line Transmission Line Project and its Associated Alternating Current Collection System Routes

Prepared for

CLEAN LINE ENERGY PARTNERS, LLC

Prepared by

SWCA Environmental Consultants

October 2014

SWCA Project Number 27517

DRAFT: DELINEATION OF POTENTIAL HABITAT FOR THE LESSER PRAIRIE-CHICKEN ALONG THE PLAINS & EASTERN CLEAN LINE TRANSMISSION LINE PROJECT AND ITS ASSOCIATED ALTERNATING CURRENT COLLECTION SYSTEM ROUTES

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1.0 INTRODUCTION

Clean Line Energy Partners, LLC (Clean Line) is planning to construct a high voltage direct current (HVDC) transmission line referred to as the Plains & Eastern Clean Line that will travel approximately 800 miles from the Oklahoma Panhandle to Memphis, Tennessee. The purpose of the HVDC transmission line is to carry electricity produced at numerous wind energy generation facilities in western Oklahoma, and the northern Texas Panhandle to markets in the Mid-South and southeastern United States. In addition to the HVDC transmission line, the Project will also include AC collection transmission lines to collect energy from generation resources in Oklahoma Panhandle Region. These AC connections are referred to collectively hereafter as the Alternating Current Collection System Routes (ACCSR).

The general location of the HVDC transmission line coincides with the range of the lesser prairie-chicken (*Tympanuchus pallidicinctus*, LEPC), a ground-dwelling fowl of the southern Great Plains that was listed by the U.S. Fish and Wildlife Service (USFWS) as a threatened species in the spring of 2014. The LEPC occurs in northwest Texas, western Oklahoma, western Kansas, southeastern Colorado, and eastern New Mexico (Hagen and Giesen 2005). The USFWS and some independent researchers have expressed concern that wind energy generation facilities and transmission lines, while not causing particularly significant amounts of direct habitat loss, may be avoided by LEPCs by distances of several hundred yards (Robel et al. 2004, Hagen et al. 2011, USFWS 2012). It is believed that such avoidance behavior may cause the birds to vacate broad swaths of otherwise suitable habitat, thus reducing and fragmenting the total effective amount of LEPC habitat present on the landscape. In turn, this could isolate and reduce local LEPC populations and the theoretical maximum LEPC population.

Clean Line is coordinating with the USFWS with regard to construction of the HVDC and ACCSR transmission lines and their potential impact on federally listed, proposed, and candidate species. To assist in the identification of possible impacts that construction of these lines could have on the LEPC, Clean Line retained SWCA Environmental Consultants (SWCA) to delineate potential LEPC habitat along the Applicant Proposed Route (APR) for the HVDC transmission line and the accompanying ACCSR. The alignment of the APR relative to the range of the LEPC in western Oklahoma is depicted on Fig. 1 along with the alignments of the ACCSR included in the habitat delineation. The APR for the HVDC line crosses through the range of the LEPC in Beaver, Harper, Texas, and Woodward counties, Oklahoma. The ACCSR are located in Beaver and Texas counties, Oklahoma, and Hansford, Ochiltree, and Sherman counties, Texas. Most segments of the ACCSR lie outside the known range of the LEPC.

The methods used to conduct the habitat delineation are identified in Section 3.0. Section 2.0 of this report provides background information on the natural history of the LEPC. A description of the lands crossed by the APR and ACCSR investigated for this assessment and the results of the habitat delineation are presented in Section 4.0.

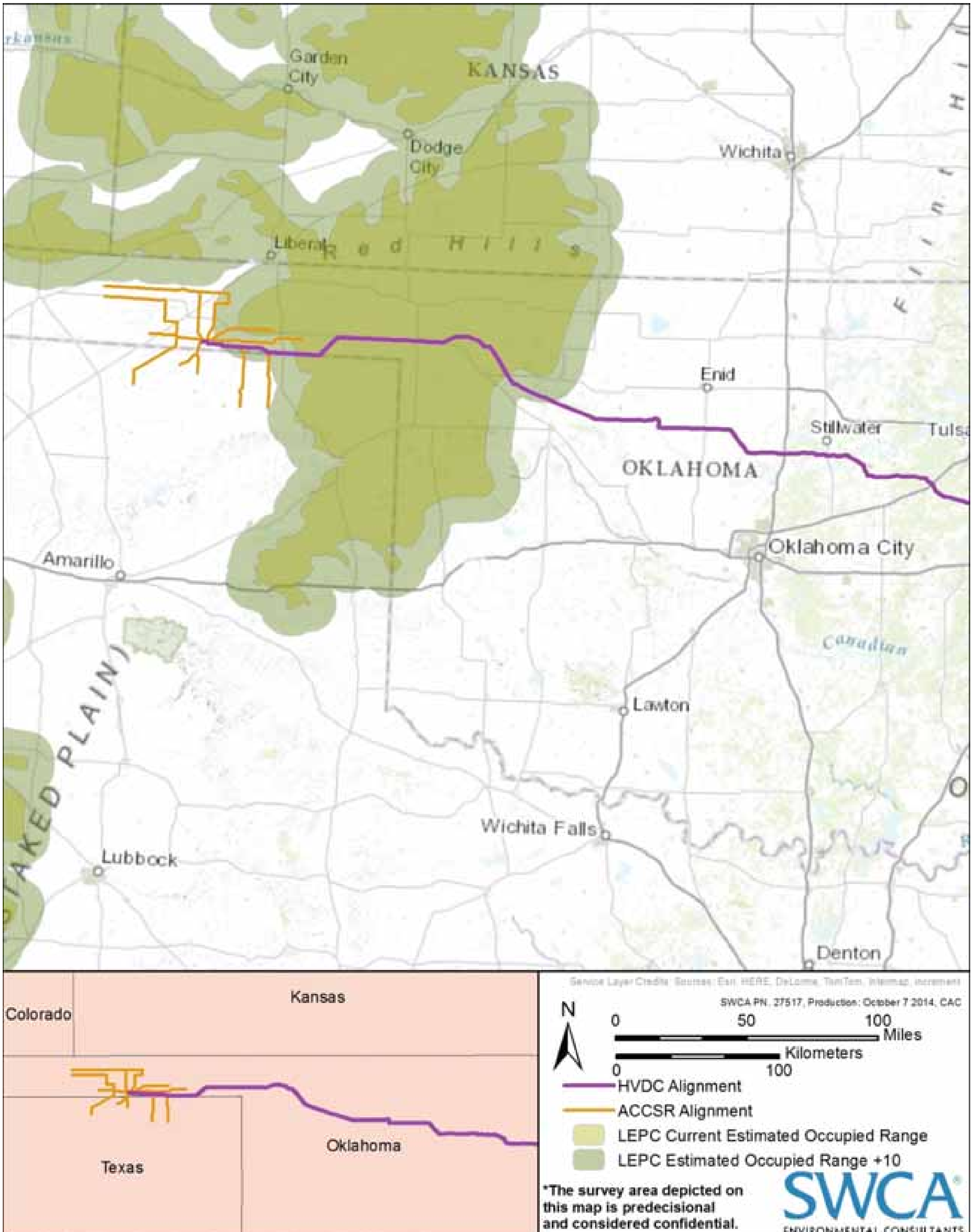

Figure 1. Location of the Applicant Preferred Route for the Plains & Eastern Clean Line and its associated ACCSR through western Oklahoma and northern Texas

2.0 LESSER PRAIRIE-CHICKEN BACKGROUND INFORMATION

The USFWS first designated the LEPC as a candidate for federal listing as a threatened or endangered species in 1998 (USFWS 1998). A final rule listing as threatened was published by the USFWS in the spring of 2014 (USFWS 2014a). The LEPC is a permanent resident of its range and occurs in portions of southeastern Colorado, southwestern Kansas, western Oklahoma, northwestern Texas, and eastern New Mexico (Hagen and Giesen 2005).

The species typically occur in areas with sandy soils that support dwarf shrub/mixed grass vegetation (Hagen and Giesen 2005). Copelin (1963) described the habitat of LEPC as shrub savannah intermediate between brushless prairie grassland and low density forest, and reported the birds did not occur in grassland lacking brush. LEPCs are most closely associated with bluestem grasses mixed with sand sagebrush (*Artemisia filifolia*) and sand shin oak (*Quercus havardii*), although there is some geographic variation in habitat usage. Grasses often present in habitats used by LEPC in Oklahoma include sand bluestem (*Andropogon hallii*), little bluestem (*Schizachyrium scoparium*), sand dropseed (*Sporobolus cryptandrus*), three-awn (*Aristida* spp.), and blue grama (*Bouteloua gracilis*) (Copelin 1963, Hagen and Giesen 2005). Elmore et al. (2009) state that "as a rule" LEPCs "cannot persist in landscapes with greater than 30 percent cultivation."

Brush was considered by Copelin (1963) an important component of LEPC habitat because it provided shade for the birds during hot weather. Sand sagebrush, sand shin oak, and other shrubs such as fragrant sumac (*Rhus aromatica*) also provide important sources of food for LEPCs during the fall and winter months, when the birds feed primarily on plant matter (Riley et al. 1993). Insects form a large part of the LEPC diet in the summer (Riley et al. 1993, USFWS 1998).

In Oklahoma, LEPCs occur in higher densities in sand shin oak communities than in sand sagebrush grasslands (Copelin 1963, Cannon and Knopf 1980). Sand shin oak communities occur in the southwestern and west-central portions of Oklahoma in Beckham, Ellis, Roger Mills, and Woodward counties (Cannon and Knopf 1980). Sand sagebrush communities are present in the northwestern portion of the state in Beaver, Cimarron, Harper, Texas and Woodward counties (Cannon and Knopf 1980).

LEPCs gather together most days from late February through early May for courtship displays (USFWS 1998, Copelin 1963). Display grounds, termed leks, are typically situated in flat areas of bare ground or very short grass. Lek sites usually occur on ridges, although valley floors will also be used if appropriate short grass is present (Copelin 1963). Disturbed grounds such as unpaved roads and abandoned oil pad sites can be used for lek activity (Robb and Schroder 2005).

Male prairie-chickens arrive at lek sites from 30 to 60 minutes before sunrise and remain at the sites for three to four hours, although peak lekking activity occurs within the first 105 minutes following sunrise (Copelin 1963, Hagen and Giesen 2005). Attendance of leks by female prairie-chickens peaks during the second and third weeks of April; the number of males attending leks drops rapidly once females cease attending and begin nesting (Hagen and Giesen 2005).

Attendance and displaying at leks in the evenings is also common in spring, with activity peaking within an hour of sunset (Crawford and Bolen 1975). LEPCs will also attend lek sites in fall, although such attendance is largely by males (Hagen and Giesen 2005). Because the birds are congregated and comparatively noisy when on their leks in the spring, biological surveys for the species are typically performed at that time of year.

Hens usually begin nesting from mid-April to late May, and typically nest within 0.75 to 2.1 miles of their lek site; clutch size is usually 10 to 12 eggs (Hagen and Giesen 2005). Nesting occurs in areas with a high percentage of cover (Hagen and Giesen 2005). Females incubate their eggs for 23 to 26 days (USFWS 1998). Young leave the nest within hours of hatching and a second nesting may be attempted if the first attempt fails (USFWS 1998). Most nests hatch from late May to mid-June, with hatching from second nesting attempts largely occurring from late June through early July (Hagen and Giesen 2005).

The RWCP describes "quality" LEPC nesting and brood-rearing habitat to guide habitat management and restoration programs for the species. Quality nesting habitat in plant communities with a substantial sand sagebrush component such as those occurring in the Study Area is described as containing 15-30 percent cover of sand sagebrush, > 30 percent cover of preferred native grasses, > 10 percent cover of native forbs, and having an average grass height > 15 inches (Van Pelt et al. 2013). Quality brood-rearing habitat is described as having the same grass height, but reduced cover of sand sagebrush (10-25 percent), reduced native grass cover (> 20 percent), increased cover of native forbs (> 20 percent), and an understory open enough to enable chick movement (Van Pelt et al. 2013).

LEPCs typically nest under cover of a shrub such as sand sagebrush or in a tall bunchgrass (Giesen 1994, Pitman et al. 2005, Pitman et al. 2006). Increased LEPC nest success has been correlated positively to: shorter distance between lek and nest sites; the height, density, and abundance of grasses at the nest site; placement of nest within or adjacent to shrubs or tall bunchgrasses; and decreased presence of bare ground cover (Riley et al. 1992, Hagen and Giesen 2005, Pitman et al. 2005). LEPCs have been found nesting in Conservation Reserve Program (CRP) grasslands, with nests typically placed in tall or mid-height bunchgrasses such as little bluestem, big bluestem (*Andropogon gerardi*), switchgrass (*Panicum virgatum*), and western wheatgrass (*Pascopyrum smithii*) (Fields 2004). The birds have also been found nesting in plots planted to Old World bluestems (*Bothriochloa ischaemum*), although these non-native grasses are considered to provide poorer quality habitat (Wolfe et al. 2003, Fields 2004, Van Pelt et al. 2013). Seemingly important to the use of CRP grasslands by LEPC is an intermixing of forbs, which increases insect availability (Fields 2004, Hagen et al. 2004).

The USFWS listed this species as threatened owing to concerns over serious declines in population and loss of habitat. Many factors have been involved in the decline in the population of this species. First and foremost has been the wide-scale elimination of habitat through conversion of land to various agricultural uses, including tilling and grazing (Mote et al. 1998). Other factors include: suppression of wildfire, which has allowed woody species such as mesquite to invade grassland habitat areas; oil and gas development, which has resulted in the extensive loss, fragmentation, or disturbance of habitat in some areas; introduction of roads, transmission lines, and other disturbances; periodic droughts (1930s, 1950s, 1990s) that caused regional population reductions; and even introduction of ring-necked pheasants, which compete with LEPCs for resources (Mote et al. 1998, Sullivan et al. 2000, Robb and Schroeder 2005).

The various habitat disturbances described above have resulted in a very patchy distribution of occupied habitat. The Wildlife Management Institute (1999) indicated that blocks of habitat nearly 25,000 acres in size may be necessary for optimum habitat conditions, but that patches of habitat as small as 1,235 acres may be capable of supporting breeding populations.

While the birds can be highly mobile they also have high site fidelity, meaning that they are not prone to wander away from their home range (Hagen and Giesen 2005). This tendency has also contributed to their decline, as isolated populations that suffer losses from disease, predation, drought, or some other cause cannot easily be replenished by birds arriving from outside sources.

The Playa Lakes Joint Venture (PLJV), a non-profit partnership of federal and state wildlife agencies, conservation groups, private industry and landowners dedicated to conserving bird habitat in the Southern Great Plains, maintains a map of the estimated occupied range (EOR) of the LEPC that is updated as on-going surveys refine knowledge of the distribution of the species (PLJV 2011). The map of the LEPC EOR was incorporated into The Lesser Prairie-Chicken Range-wide Conservation Plan (RWCP) developed by the Western Association of Fish and Wildlife Agencies (WAFWA) (Van Pelt et al. 2013). The EOR is also used in the LEPC Crucial Habitat Assessment Tool (CHAT) developed by the Kansas Biological Survey and numerous cooperating wildlife agencies (Southern Great Plains Crucial Habitat Assessment Tool. August, 2013. kars.ku.edu/maps/sgpchat/).

Since habitat loss is the most significant cause for a decline in the species, the development of transmission lines has become a concern because it is believed that LEPCs avoid large, permanent structures, including transmission lines (Pruett et al. 2009, Hagen et al. 2011). Some studies have investigated how LEPCs respond to presence of various human disturbances. These studies showed that LEPCs generally avoided vertical structures, with non-breeding birds generally staying at least 0.37 mile away from buildings and transmission lines. Most prairie-chicken nests were found to be placed at least 0.78 mile from buildings, 0.49 mile from improved roads, and 0.22 mile from transmission lines (Robel et al. 2004, Pitman et al. 2005). Pitman et al. (2005) found that distance to various disturbance types was a poor predictor of nest success, with success more dependent on vegetative characteristics. Tall vertical structures, such as certain types of transmission line structures, may provide roosting and nesting substrates for various raptor species (Robb and Schroeder 2005). Because adult LEPCs and their chicks are preyed upon by raptor species, avoidance of structures could be a predation-avoidance response. The Lesser Prairie-Chicken Interstate Working Group Science Team recently reviewed literature to identify the avoidance distances that are associated with various types of development activities to assist in development of the RWCP (Van Pelt et al. 2013). Based on this review, the RWCP utilizes an impact buffer distance of 400 meters (1,312 feet) for transmission lines ≥ 69 kV.

3.0 HABITAT ASSESSMENT METHODS

An SWCA biologist familiar with LEPCs and their habitat requirements inspected lands that would be crossed by the APR and its associated ACCSR lines on 21-25 July 2014 to evaluate their ability to provide nesting and brood-rearing habitat for LEPCs. Inspection was limited to lands occurring within 400 meters (1,312 feet) of the centerlines of those segments of the proposed APR and ACCSR transmission line routes that occur within 10 miles of the LEPC EOR. Land occurring in and within 10 miles of the EOR is referred to as the EOR+10, and is the area covered by the WAFWA RWCP. The RWCP covers an area 10 miles beyond the EOR boundary to safeguard against inaccuracies in the mapping of the EOR and to allow for shifts in the range of the species (Van Pelt et al. 2013). It was decided to evaluate all lands crossed by the proposed transmission line routes within the EOR+10 to similarly safeguard against imperfect knowledge of the range of the LEPC in the general project region. The habitat assessment was limited to lands occurring within 400 meters of route centerlines because this is the distance used in the RWCP as approved by the USFWS to quantify pre-existing disturbance to LEPC habitat caused by $\geq$ 69 kV transmission lines. Locations of the transmission line segments evaluated for LEPC habitat suitability are shown on Fig. 2.

Lands occurring within 400 meters of these segments of line within the EOR+10 are hereafter referred to as the Study Area. As shown on Fig. 2, the southern edge of the Study Area extends into the western edge of Major County. All of the Study Area lies within the historical range of the LEPC. Field inspection of the Study Area was restricted to what could be viewed from publicly accessible roads. Descriptions of vegetation occurring on the lands within the Study Area were recorded and representative photographs of vegetation communities were taken.

The LEPC habitat assessment was performed in accordance with the Clean Line Data Collection and Evaluation Plan (DCEP) as reviewed and approved by the USFWS (Ecology and Environment, Inc. 2014). This required describing vegetation in each homogenous vegetation unit within the Action Area as allowed by visibility from public road, with descriptions based on criteria for defining habitat quality contained in the RWCP (Van Pelt et al. 2013). The criteria for defining habitat quality in the RWCP are vegetative cover, vegetative composition, percent cover of tall woody plants, and availability of potential habitat. Habitat quality under the RWCP is scored on a scale of 0.0 to 1.0, with 1.0 being highest quality. A score of 0.0 is attainable only if < 1 percent of land within 1 mile of an examined vegetation unit supports grass cover. One percent of the area of a circle with a radius of 1 mile is approximately 20.1 acres. Thus, under the RWCP system, a vegetation community completely unsuitable for use by LEPCs (e.g., a plot of dense woodland) is considered LEPC habitat of some value as long as it has a little more than 20 acres of grassland within 1 mile of it.

Contrary to the RWCP system, vegetation communities that did not appear to provide habitat suitable for LEPC nesting or brood-rearing (e.g., woodlands, croplands, and extensive stands of shortgrass prairie) were not identified in this assessment as potential LEPC nesting and brood-rearing habitat, but instead were classified in other land cover categories. Microsoft 2010 World Imagery was used to characterize vegetation communities occurring along the proposed transmission line routes that could not be seen from public roads. The appearance of known vegetation communities present along the inspected routes was used to inform the delineation of vegetation communities within the Study Area. Known and inferred vegetation characteristics were then compared against known LEPC habitat characteristics to make decisions regarding suitability of vegetation present along the transmission line routes to serve as LEPC habitat.

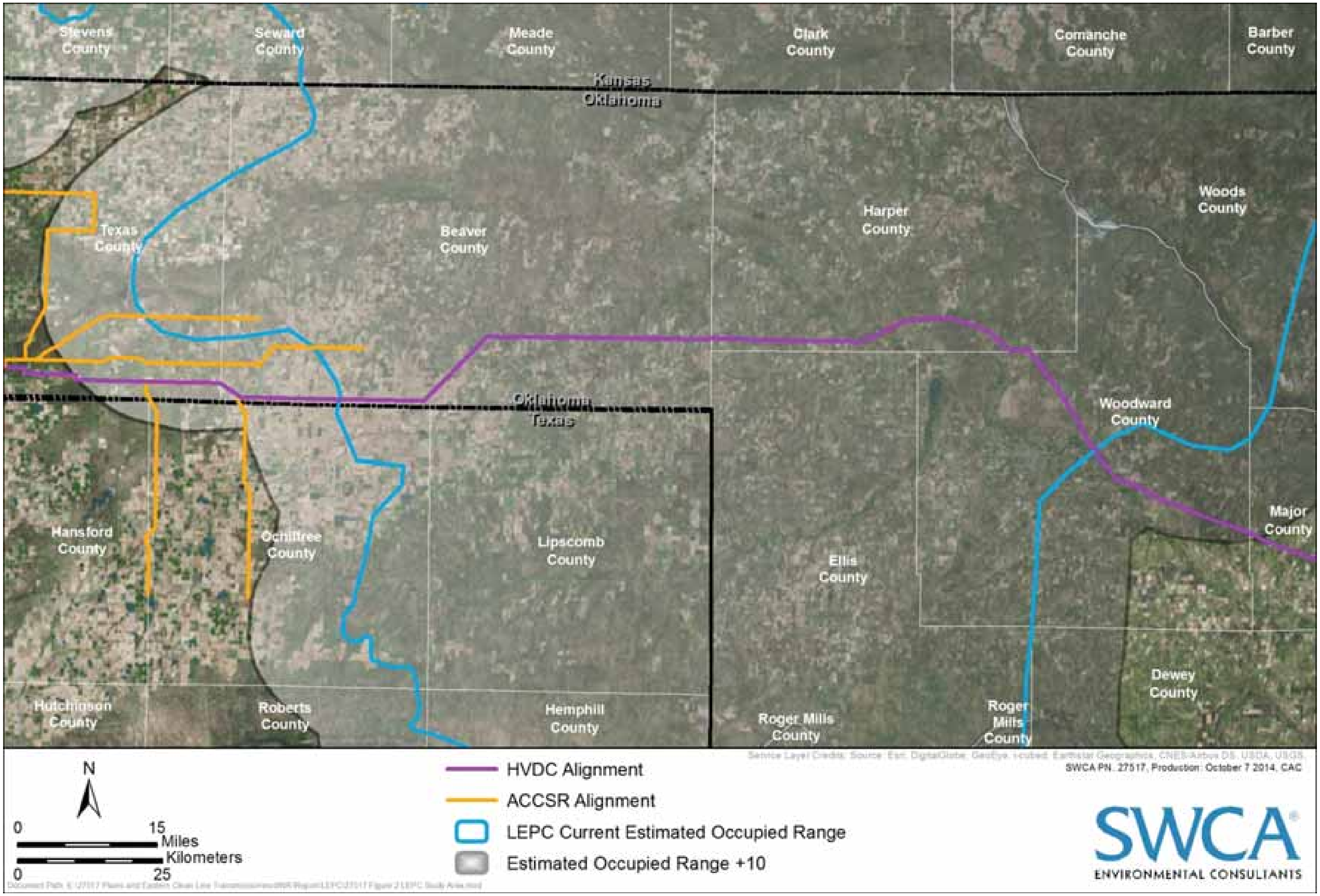

Figure 2. Location of transmission line segments considered in the habitat assessment

Potential nesting and brood-rearing habitat in this assessment was identified as either “good” or “low” quality. Vegetation that appeared highly suitable for use by LEPCs and met the RWCP description of quality habitat (Van Pelt et al. 2013) was classified as good habitat.

Vegetation identified as low quality LEPC habitat also appeared suitable for use by the species, but did not contain all elements of highly suitable habitat. In comparison to vegetation identified as good quality habitat, low quality habitat typically had sub-optimal percent cover of sand sagebrush (< 10 percent or > 30 percent), sub-optimal percent cover of taller native grasses (< 20 percent), sub-optimal percent cover of native forbs (< 10 percent), contained relatively high abundance of Old World bluestems, or contained > 0 but ≤ 5 percent cover of scattered small trees. If total tree cover was > 5 percent, it was not identified as potential LEPC habitat.

In addition to vegetative characteristics, patch size was also used in some cases to decide whether or not to classify a particular plot of vegetation as potential LEPC habitat. The RWCP allows that the minimum amount of habitat needed to support a population of LEPC is unclear, but cites several studies indicating that it may be at least 1,200 acres (Van Pelt et al. 2013). It seems likely that surrounding land uses exert influence on how small a patch of habitat can be and still be capable of supporting a population of LEPCs. In those portions of the Study Area where dominant land cover at the landscape level is not grassland, discrete patches of native grassland of appropriate structure and species composition were not considered potential LEPC habitat if they were less than 640 acres in extent. This was considered a conservative size given it is about half of what has been identified as the likely minimum patch size. It also was often easily determined because most land crossed by the Study Area is partitioned by roads into 1-square-mile blocks. This minimum patch size requirement was not applied in those portions of the Study Area where land cover is dominated by grassland or consists of a mosaic of grassland and agricultural land.

Proximity of vegetation to anthropogenic features was not a criterion used to differentiate potential LEPC habitat from non-habitat. However, location was sometimes used to assign relative quality (good vs. low) based on distance of a patch of potential habitat from the EOR boundary. The LEPC CHAT website (kars.ku.edu/maps/sgpchat/) provides information that includes electronic shapefiles for use with Geographic Information Software (GIS) that depict extent of 2009-2013 LEPC survey coverage and locations of LEPC leks found during surveys conducted from 2008-2012. This information reveals that nearly the entire range of the LEPC in Oklahoma has been surveyed for the species at least once in the past 5 five years, which in turn suggests to us that the EOR boundary as drawn in Oklahoma is reasonably accurate.

Species of birds and other wildlife observed incidental to the habitat assessment were recorded during the field visit. No LEPCs were observed by SWCA while present in the general area, although all other species of chicken-like birds expected to occur in western Oklahoma were seen. These included northern bobwhite (*Colinus virginianus*), scaled quail (*Callipepla squamata*), ring-necked pheasant (*Phasianus colchicus*), and wild turkey (*Meleagris gallopavo*).

4.0 HABITAT ASSESSMENT

4.1 General Study Area Description

The Study Area crosses through portions of three Level III Oklahoma ecoregions (Oklahoma Forestry Services 2007). One of these ecoregions, the High Plains, is restricted to the Oklahoma Panhandle. A second, the Southwestern Tablelands, is mostly restricted to the Panhandle, but also occurs in the southwestern portion of the state. The third ecoregion, the Central Great Plains, covers much of the western half of Oklahoma, excluding the Panhandle. The range of the LEPC lies largely but not entirely within the High Plains and Southwestern Tablelands ecoregions.

The High Plains ecoregion is described by the Oklahoma Forestry Services (2007) as smooth to slightly irregular plains that historically supported shortgrass prairie but now have largely been converted to cropland. Although ecoregion boundaries are not identified on Fig. 2, the distribution of the High Plains ecoregion in counties of the Study Area is well demarcated by the extensive amounts of straw-colored cropland visible on the aerial photograph in southwest and northwest Beaver County, northeast Texas County, and across much of Ochiltree County. All land in the Study Area occurring within the High Plains Level III ecoregion occurs within the Level IV ecoregion sub-division, the Canadian/Cimarron High Plains (Woods et al. 2005). Woods et al. (2005) describe the Canadian/Cimarron High Plains ecoregion as nearly level, rolling or hummocky plains formed of Quaternary loess, with playas occurring in scattered depressions.

The Southwestern Tablelands contains rolling to rugged topography and contains comparatively small amounts of cropland. Lands in this ecoregion are used primarily for grazing livestock and historically supported prairie and shrubby grassland (Oklahoma Forestry Services 2007). The Study Area crosses through this ecoregion in the eastern half of Beaver County and through the southwest corner of Harper County. Grasslands of this ecoregion appear a dull olive green or grayish-green on the aerial photograph used as the base for Fig. 2.

All land in the Study Area occurring within the Southwestern Tablelands is classified within the Level IV ecoregion sub-division, the Canadian/Cimarron Breaks (Woods et al. 2005). Woods et al. (2005) describe the Canadian/Cimarron Breaks ecoregion as characterized by dissected canyons, hills, and escarpments formed of Quaternary alluvium and Tertiary-age clastic sediments that support shortgrass and mixed grass prairies and riparian woodlands.

The Central Great Plains contain gentle to rolling topography and historically supported grassland, with scattered trees and shrubs present in the southern portion of the region (Oklahoma Forestry Services 2007). Like the High Plains, much of the land in this ecoregion has been converted to cropland. The Study Area lies within this ecoregion in south-central and southeast Harper County, Woodward County, and Major County.

Two Level IV sub-divisions of the Central Great Plains are crossed by the Study Area, the Pleistocene Sand Dunes and the Rolling Red Hills (Woods et al. 2005). The Pleistocene Sand Dunes ecoregion is described as containing active, barren, and stabilized sand dunes that historically supported sand sagebrush-bluestem prairie, cross timbers, and oak shinnery, but today mostly supports sand sagebrush-grassland with trees stabilizing dunes in eastern portions of the region (Woods et al. 2005). The Rolling Red Hills are described as dissected rolling to rugged hills and breaks formed mostly from Permian-age sedimentary formations (Woods et al. 2005). Vegetation in the ecoregion is varied and consists of a combination of mixed grass and shortgrass prairie, oak savanna, riparian woodland, and oak shinnery interspersed with cropland, with eastern red cedar (*Juniperus virginiana*) now common in the region because of fire suppression and livestock grazing (Woods et al. 2005).

Based on all previously presented information, it can be inferred that habitat for the LEPC was perhaps once widespread through all three Level III ecoregions, but today it can be expected that habitat is largely restricted to the Southwestern Tablelands because of conversion of land in the other two ecoregions to cropland and, in the Central Great Plains, because of increased presence of eastern red cedar.

Overall, the results of our field investigation and review of aerial photography indicate that the Study Area crosses a region that generally matches the ecoregion descriptions provided above. Eastern red cedar trees are mostly common to abundant in the Central Great Plains ecoregion on the eastern end of the Study Area. The relative abundance of trees in the Study Area decreases to the west, with trees on the western end of the Study Area in the High Plains ecoregion largely restricted to water courses or sites where planted for ornamental purposes, to provide shade, or to act as wind breaks. Cropland is abundant in the High Plains ecoregion on the west end of the Study Area and occurs commonly in the central and east sides of the area, where it is interspersed with plots of grassland, improved pastures, and patches or strands of woodland. Most but not all grasslands on the east side of the Study Area have been invaded to varying degree by trees, primarily eastern red cedar, common hackberry (*Celtis occidentalis*), and Siberian elm (*Ulmus pumila*).

A general landscape-scale map of land cover occurring within 10 miles of the Study Area is provided as Fig. 3. This map was developed by SWCA using recent digital aerial photography and was primarily compiled at a scale of 1:100,000 to 1:250,000. The mapping was designed to be more generalized than the mapping of land cover available in digital format through the National Land Cover Database 2011 (Jin et al. 2013). The purpose of this map is to provide a general overview of land cover in the region. Land cover was mapped out to a distance of 10 miles from the Study Area to mirror the buffer added to the EOR by WAFWA in its RWCP.

As can be seen on this figure, the western and central portions of the Study Area cross though regions that largely contain open vegetation communities. These communities consist mostly of croplands, improved pastures, and grasslands that for the sake of brevity in the figure legend are identified as Cultivated, Grassland, and Crop-Grass Mix depending on relative dominance of land cover type. Lands identified as Cultivated almost exclusively contain croplands and improved pastures. Native grasslands are prevalent in areas identified as Grassland, while areas identified as Crop-Grass Mix generally contain a mosaic of croplands, improved pastures, and plots of native grassland.

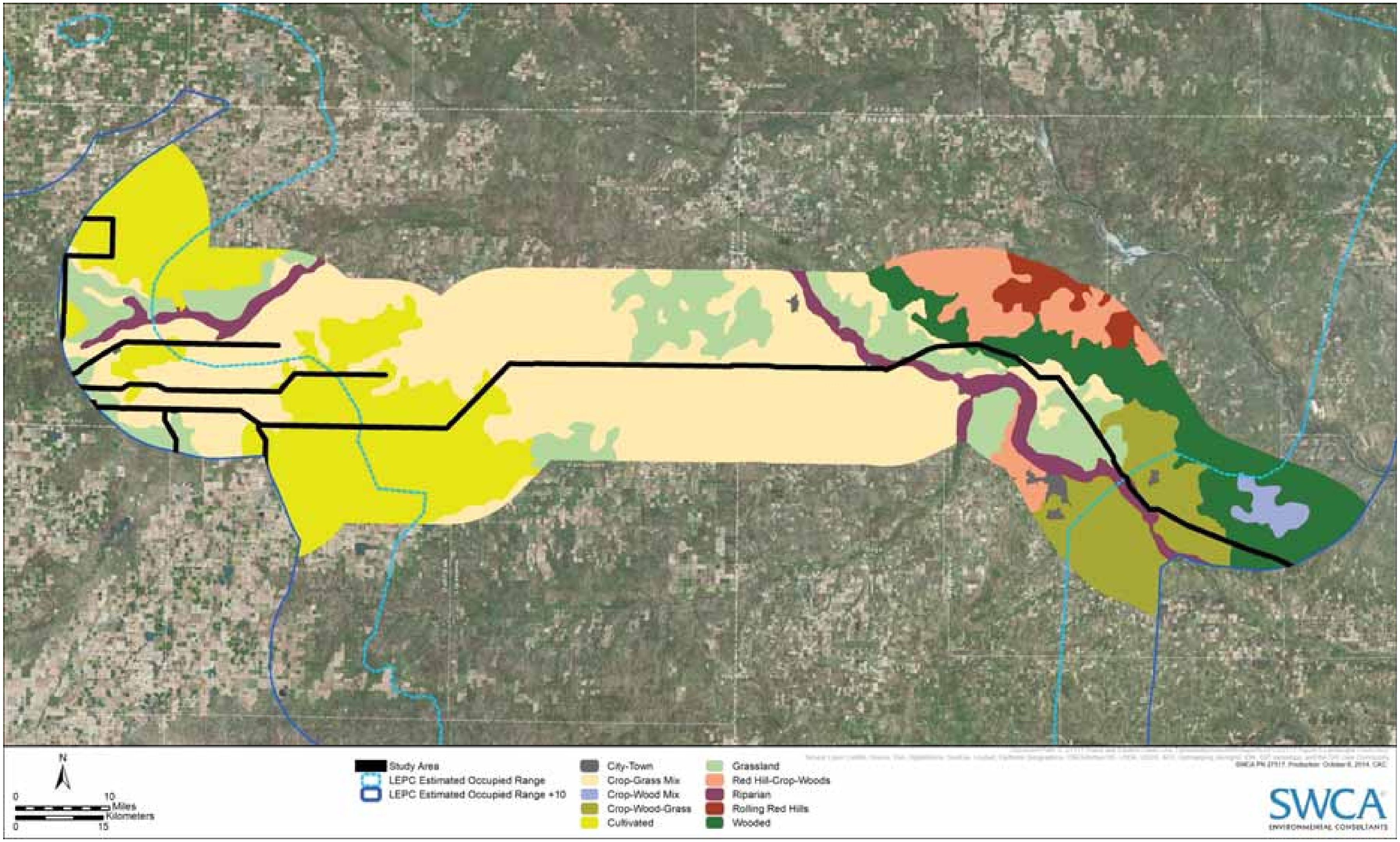

Figure 3. Landscape-scale land cover of the Study Area region

The east side of the Study Area supports woodland or mosaics of woodland, cropland, improved pasture, and plots of grassland, although most grasslands on this side of the Study Area have been invaded to some degree by small trees. The east side of the Study Area runs between the cities of Woodward and Mooreland, and lands surrounding this end of the Study Area also appear to support a larger human population than do lands crossed by the Study Area farther to the west.

Fig. 3 demonstrates that even in absence of site-specific knowledge of vegetative conditions, the chance for lesser prairie-chickens to occur on the east side of the Study Area where woody vegetation communities dominate the landscape can be foreseen to be extremely low. It can also be predicted that LEPCs are extremely unlikely to occur in the Study Area where lands are extensively cultivated. Based on general land cover as depicted on Fig. 3, it can be guessed that LEPCs are most likely to occur in the Study Area, assuming local habitat conditions are suitable, in areas identified as Grassland or Crop-Grass Mix.

4.2 Study Area Land Cover

Most of the lands crossed by the proposed transmission line segments that define the Study Area are used for agricultural purposes such as growing crops and grazing livestock and have been divided by secondary roads and sub-divided by fences. Some former agricultural land in the Study Area appears to have been planted with native grasses through the CRP. The Study Area also is crossed by highways and rivers, passes through a wind energy generation facility, and contains many houses and oil and gas well pads and a few industrial facilities. As a result, the Study Area contains numerous vegetation communities and land cover types. For the purpose of delineating suitable nesting and brood-rearing LEPC habitat, we identified eight basic land cover categories to classify vegetation communities and land uses in the Study Area. These land cover categories include: Cropland, Other Agricultural, Invaded Grassland, Non-Habitat Grassland, Short Herbaceous, Non-Herbaceous, Good LEPC Habitat, and Low Quality LEPC Habitat. Each of these categories is described below.

Cropland: This category consists of tilled fields used for raising crops. Not all fields included in this category were being used for crop production during the time of our July visit to the Study Area. Many fields were barren and some were fallow. Crops observed being raised in the Study Area included corn, wheat, and sorghum. Fallow fields in the Study Area commonly support weedy species such as Palmer amaranth (*Amaranthus palmeri*), tumbleweed (*Salsola tragus*), kochia (*Kochia scoparia*), western ragweed (*Ambrosia psilostachya*), Johnsongrass (*Sorghum halepense*), smooth pigweed (*Amaranthus hybridus*), prostrate pigweed (*Amaranthus blitoides*), horseweed (*Conyza canadensis*), field bindweed (*Convolvulus arvensis*), and prostrate spurge (*Euphorbia prostrata*), among others. Examples of land included in this category are shown in Photos 1 and 2. Cropland does not provide nesting or brood-rearing habitat for the LEPC, although LEPC are known to feed on sorghum and other small grain in fields intermixed with suitable habitat, especially in fall and winter when insects are not available (Hagen and Giesen 2005).

Other Agricultural: This is a catch-all category used to categorize all agricultural lands other than tilled fields. Included in this category were hayfields, pastures planted with Old World bluestems, some other improved pastures, and disturbed areas used for storage of hay bales or farm equipment. Improved pastures occur commonly in the Study Area, with many of these pastures supporting only one or two species of grass and being devoid or nearly devoid of shrubs, succulents, and forbs. The most commonly occurring grasses in monotypic or other low diversity pastures within the Study Area include Old World bluestems, sideoats grama (*Bouteloua curtipendula*), and silver bluestem (*Bothriochloa saccharoides*). Improved pastures composed of tall bunchgrasses such as little bluestem that have been shown to be used for nesting by LEPCs are rare in the Study Area. Improved pastures consisting of pure or nearly pure stands of grass composed of somewhat shorter grasses like Old World bluestems, sideoats grama, or silver bluestem were classified within the Other Agricultural category and not identified as potential nesting/brood-rearing LEPC habitat because they lacked the forb component needed for CRP grasslands to support nesting by the species (Fields 2004, Hagen et al. 2004). Examples of land classified as Other Agricultural are shown in Photos 3 through 6.

Photo 1. Looking east down the APR corridor from County Road 182 at land classified as Cropland; southern Harper County. Town of May in the background.

Photo 2. Looking west down the APR corridor from County Road 131 at land classified as Cropland; southwest Beaver County.

Photo 3. Looking west down the APR corridor from County Road 121 at a grazed Old World bluestem pasture (left) classified as Other Agricultural (Cropland to right); southwest Beaver County.

Photo 4. Looking south down the APR corridor from County Road 29 at a mowed hayfield classified as Other Agricultural; northern Woodward County. Note the lack of shrubs and near absence of forbs.

Invaded Grassland: This category encompasses grasslands of any base species composition with > 5 percent cover of trees greater than 3 feet tall. This limit was chosen based on scoring metrics of the RWCP. Under the RWCP, vegetation with percent cover of tall woody plants in the 0 – 5 range receives a score of 0.6 – 1.0, while vegetation with cover > 5 percent receives a score of 0.25. Trees invading grasslands in the Study Area are mostly eastern red cedar, but common hackberry and Siberian elm are also present in some areas. Invaded Grasslands are present only in the Central Great Plains ecoregion along the eastern third of the APR alignment, where wooded communities overall occur commonly on the landscape. Examples of Invaded Grassland are shown in Photos 7 and 8. Invaded Grasslands contain too many trees to be considered potential LEPC habitat.

Photo 5. Looking southeast across ACCSR centerline from intersection of State Highway 94 and County Road M at an Old World bluestem pasture classified as Other Agricultural; eastern Texas County.

Photo 6. Looking southeast from an ACCSR alignment at the intersection of County Roads 29 and 129 at an Old World bluestem pasture classified as Other Agricultural; southwest Beaver County.

Photo 7. Looking northwest down the APR corridor from the intersection of County Roads 30 and 204 at land classified as Invaded Grassland; northern Woodward County.

Photo 8. Looking west down the APR corridor from County Road 218 at land classified as Invaded Grassland; southeast Woodward County.

Non-Habitat Grassland: This is a relatively broad category used to classify grasslands and improved pastures composed of mid-height or short and mid-height grasses, often but not always mixed with sand sagebrush, soapweed yucca (*Yucca glauca*), and various forbs, Non-Habitat Grassland was not considered suitable nesting or brood-rearing habitat for LEPC due to various and often multiple factors, including: small patch size; severe degradation by grazing; setting of the grassland in a predominantly woody, developed, or cultivated landscape; invasion by woody species (≤5 percent cover); and absence or near absence of dwarf shrubs. Lands identified as Non-Habitat Grassland occur widely in the Study Area and varied in character from site to site. Examples of land identified as Non-Habitat Grassland are shown in Photos 9 through 12.

Photo 9. Looking southeast down the APR corridor from the intersection of State Highway 50 and County Road 42 at land classified as Non-Habitat Grassland; central Woodward County. Not classified as potential LEPC habitat owing to small patch size (~160 acres) and setting in a landscape dominated by woody communities.

Photo 10. Looking south across ACCSR corridor from County Road 31 to the west of County Road 117 in southwest Beaver County at sand sagebrush prairie classified as Non-Habitat Grassland. Not identified as potential LEPC habitat because heavy grazing has removed nearly all taller grass cover.

Photo 11. Looking south down an ACCSR corridor near EOR+10 boundary that follows an existing transmission line along County Road 41, Texas County. Land classified as Mixed Grassland. Not classified as potential LEPC habitat owing to proximity to existing disturbances, sub-optimal species composition, and setting in predominantly cultivated landscape.

Photo 12. Looking east down the APR corridor from County Road 168 at land classified as Mixed Grassland; southwest edge of Harper County. Not classified as potential LEPC habitat owing to proximity to existing disturbance, setting in predominantly cultivated landscape, and light scattering of trees.

Short Herbaceous: This category primarily contains native shortgrass prairie, but was also used to categorize large black-tailed prairie dog (*Cynomys ludovicianus*) towns where grasses that might otherwise grow taller are kept in a short, manicured state by the rodents. Prairie dogs occur rather commonly in the western half of the Study Area. Native shortgrass prairies in the Study Area are composed largely of blue grama and buffalograss (*Buchloe dactyloides*). Some grasslands identified as Short Herbaceous also contain low to very low densities of sideoats grama, three-awn, and silver bluestem. If grazed heavily, areas identified as Short Herbaceous also commonly contain scattered soapweed yucca, prickly pear (*Opuntia macrorhiza*), bull thistle (*Cirsium vulgare*), and curlycup gumweed (*Grindelia squarrosa*). Examples of lands identified as Shortgrass are shown in Photos 13 and 14. Extensive stands of shortgrass prairie were not identified as potential LEPC habitat because they do not provide the taller cover required by the species. However, shortgrass is a common component of grassland mosaics within the range of the LEPC and members of the species use patches of shortgrass for lekking purposes. Smaller stands of shortgrass were not differentiated out of grassland matrices that overall appeared suitable for use by LEPCs and were included in areas identified as potential LEPC habitat.

Photo 13. Looking west from County Road 49 down an ACCSR corridor at land classified as Shortgrass; eastern Texas County. Supporting mostly buffalograss, with light scatter of three-awn, Old World bluestem, sand milkweed (*Asclepias arenaria*), bull thistle, and western ironweed (*Vernonia baldwinii*).

Photo 14. Looking northwest from County Road 152 across the APR corridor at land classified as Shortgrass; southern Beaver County. Grassland mostly blue grama and buffalograss, with light scatter of three-awn, silver bluestem, and sand milkweed.

Non-Herbaceous: This is a broad category into which we placed most non-herbaceous land cover types that were obviously not suitable LEPC habitat. Included in this category were paved and unpaved public roads, oil and gas well pads, wind energy generation facilities, compressor stations and other industrial sites, riparian woodlands, woodlots, concentrations of ranch or farm buildings, homesteads, large stockponds (smaller stock ponds generally were not differentiated from surrounding vegetation), and swine farms. The limits of these features were generally identified individually; however, because the eastern end of the Study Area crosses through a landscape that is predominantly wooded, we classified that entire end of the Study Area as Non-Herbaceous and in that area did not separate out the few cropfields and pastures present that otherwise could have been identified as Cropland and Other Agricultural, respectively. Examples of areas classified as Non-Herbaceous are shown in Photos 15 and 16.

Good LEPC Habitat: This category was used to identify vegetation that appeared highly suitable for use by LEPCs, based on its species composition, structure, and overall availability of similar vegetation on the landscape. Vegetation in this category meets the RWCP definition of quality LEPC habitat (Van Pelt et al. 2013) and largely consists of native grassland mixed with forbs and shrubs and sub-shrubs such as sand sagebrush, soapweed yucca, sand plum (*Prunus gracilis*), and fragrant sumac. No sand shin oak was observed in the Study Area. Grasses and forbs present in areas identified as Good LEPC Habitat vary to some degree by site but include little bluestem, sideoats grama, blue grama, sand dropseed, tall dropseed (*Sporobolus compositus*), three-awn, Canada wildrye (*Elymus canadensis*), western wheatgrass, gray golden aster (*Heterotheca canescens*), silver sagebrush (*Artemisia cana*), Texas croton (*Croton texensis*), prairie coneflower (*Ratibida columnifiera*), firewheel (*Gaillardia pulchella*), curlycup gumweed, small-flowered guara (*Oenothera curtiflora*), bigfruit evening primrose (*Oenothera macrocarpa*), dayflower (*Commelina erecta*), spectacle-pod (*Dimorphocarpa candicans*), western ragweed, silverleaf nightshade (*Solanum elaeagnifolium*), sand milkweed, white milkwort (*Polygala alba*), white prickly poppy (*Argemone polyanthemos*), and common sunflower (*Helianthus annuus*). Examples of lands identified as Good LEPC Habitat are depicted in Photos 17 - 19.

Photo 15. Looking west down the APR corridor from County Road 223 near east end of Study Area at land classified as Non-Herbaceous; southeast Woodward County. Woodland composed of eastern red cedar, post oak (*Quercus stellata*), western soapberry (*Sapindus saponaria* var. *drummondii*), slippery elm (*Ulmus rubra*), and common hackberry. Small pasture between road and woodland not differentiated out from area classified as Non-Herbaceous.

Photo 16. Swine farm in an ACCSR corridor in Texas County on the south side of County Road 19 between County Roads 42 and 43 that was classified as Non-Herbaceous.

Photo 17. Looking east along the APR corridor within the LEPC EOR from County Road 1883 at land classified as Good LEPC Habitat; southern Harper County. Little bluestem, sideoats grama, sand dropseed, blue grama, and three-awn mixed with sand sagebrush, sand plum, and various forbs. Developed on stabilized sand dunes in the Pleistocene Sand Dunes Level IV ecoregion of the Central Great Plains.

Photo 18. Looking south from U.S. Hwy. 412 in the LEPC EOR at the APR corridor at land classified as Good LEPC Habitat; southeast Beaver County. Sand sagebrush prairie containing sideoats grama, sand dropseed, and little bluestem occurring within the Southwestern Tablelands ecoregion.

Photo 19. Looking northeast at an ACCSR corridor from the intersection of County Roads 47 and EE at land classified as Good LEPC Habitat. Outside of the LEPC EOR in southeast Texas County. An extensive stand of grassland containing sideoats grama, hairy grama (*Boutelous hirsuta*), silver bluestem, blue grama, three-awn, and sand sagebrush in the Southwestern Tablelands ecoregion.

Photo 20. Looking north across the APR corridor from County Road 42 west of State Highway 50 at land classified as Low Quality LEPC Habitat in the Pleistocene Sand Dunes Level IV ecoregion; central Woodward County. A mix of grasses, forbs, and sand plum; identified as Low Quality LEPC Habitat owing to location outside EOR, setting in a primarily woody/agricultural landscape, absence of bluestems, relatively great abundance of western ragweed, and light scatter of salt cedar (*Tamarix chinensis*).

Low Quality LEPC Habitat: This category was used to classify vegetation that possesses characteristics of known LEPC habitat and in places could be and probably is used by the species, but that does not contain all elements of highly suitable LEPC habitat. This category was also used to identify vegetation that appeared similar to known LEPC habitat but was so far removed from the EOR and set in unsuitable landscape conditions such that the potential for LEPCs to occur in the vegetation was considered to be exceedingly low, if not zero (especially if accepting that the mapping of the current EOR boundary by the PLJV and used in the CHAT is reasonably accurate). Examples of grasslands identified as Low Quality LEPC Habitat are depicted in Photos 20 – 22.

The distribution in the Study Area of the cover types described above is depicted on Figs. 4.1 – 4.15. A summary of the amount of each cover type occurring in the total Study Area, and that portion of the Study Area occurring only in the EOR is provided in Table 1. As indicated in Table 1, Cropland, Other Agricultural, and Low Quality LEPC Habitat are the three most abundant types of land cover identified in the Study Area.

Photo 21. Looking northeast from the intersection of County Roads 38 and 209 across the APR corridor at land identified as Low Quality LEPC Habitat. Inside the LEPC EOR in the Pleistocene Sand Dunes ecoregion in central Woodward County. Identified as low quality potential habitat owing to very low abundance of grasses (mostly forbs and sand sagebrush), high density of sand sagebrush, and presence of low density of trees throughout.

Photo 22. Looking south at the APR corridor from County Road GG between County Roads 48 and 49 in southeast Texas County at land classified as Low Quality LEPC Habitat. A mix of forbs, sand dropseed, blue grama, three-awn, sand sagebrush, and occasional soapweed yucca in the Southwestern Tablelands ecoregion. Identified as low quality potential habitat owing to absence of bluestems, low overall abundance of all grasses, presence of a few trees locally, and location about 7.5 miles from the LEPC EOR boundary.

Table 1. Summary of Land Cover in the Study Area

Land Cover	Total in Study Area (ac.)	Total in EOR in Study Area (ac.)
Cropland	17,018.4	8,347.1
Other Agricultural	17,571.9	8,137.9
Invaded Grassland	2,194.4	1,041.4
Non-Habitat Grassland	5,360.3	1,679.9
Good Quality LEPC Habitat	4,391.4	1,971.5
Low Quality LEPC Habitat	15,475.3	8,695.7
Short Herbaceous	2,793.3	1,189.5
Non-Herbaceous	8,260.1	3,825.4

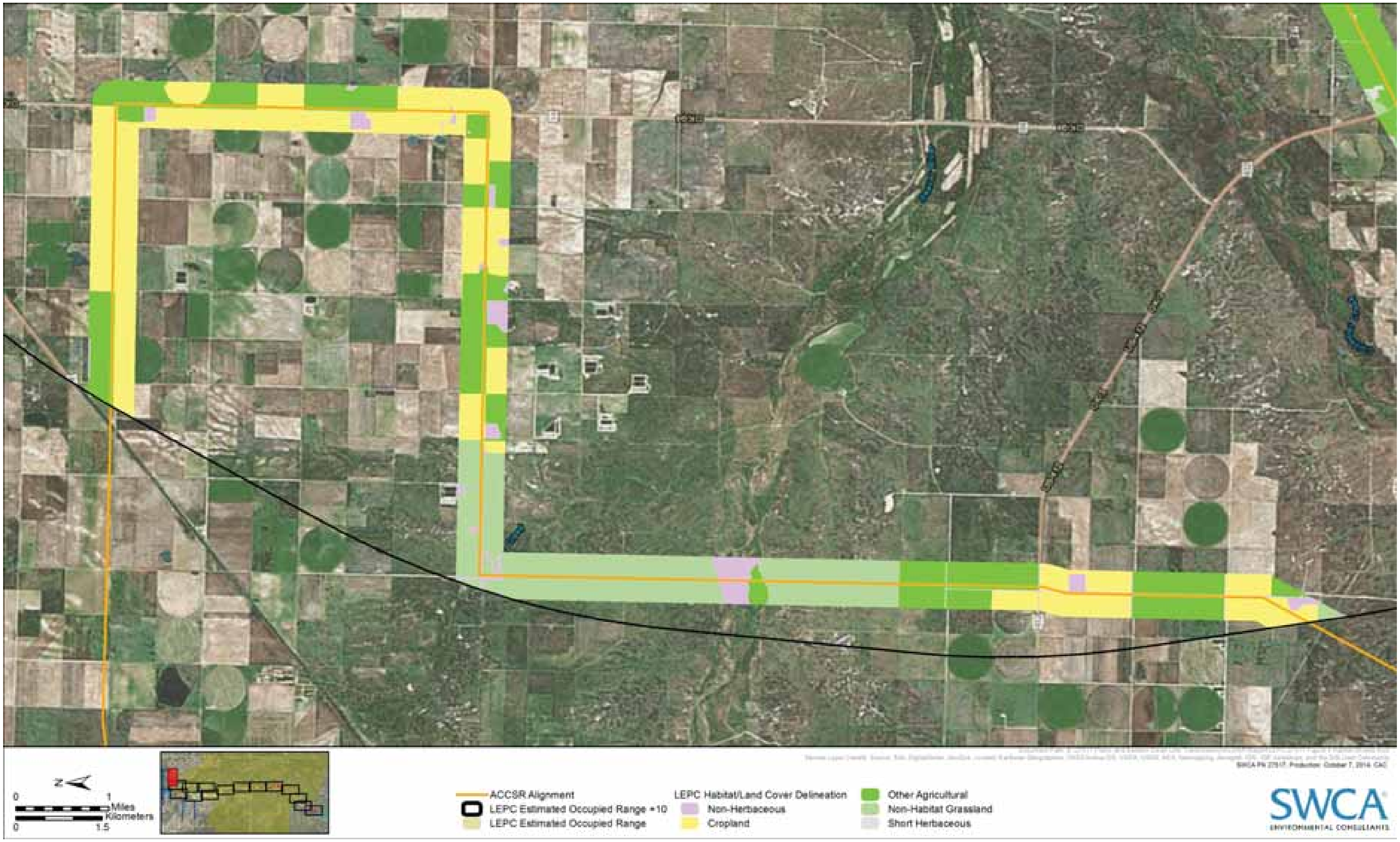

Figure 4.1. Landcover along possible alignments for ACCSR Connectors NE 1 and NE 2 on the west side of the Study Area, Texas County, Oklahoma

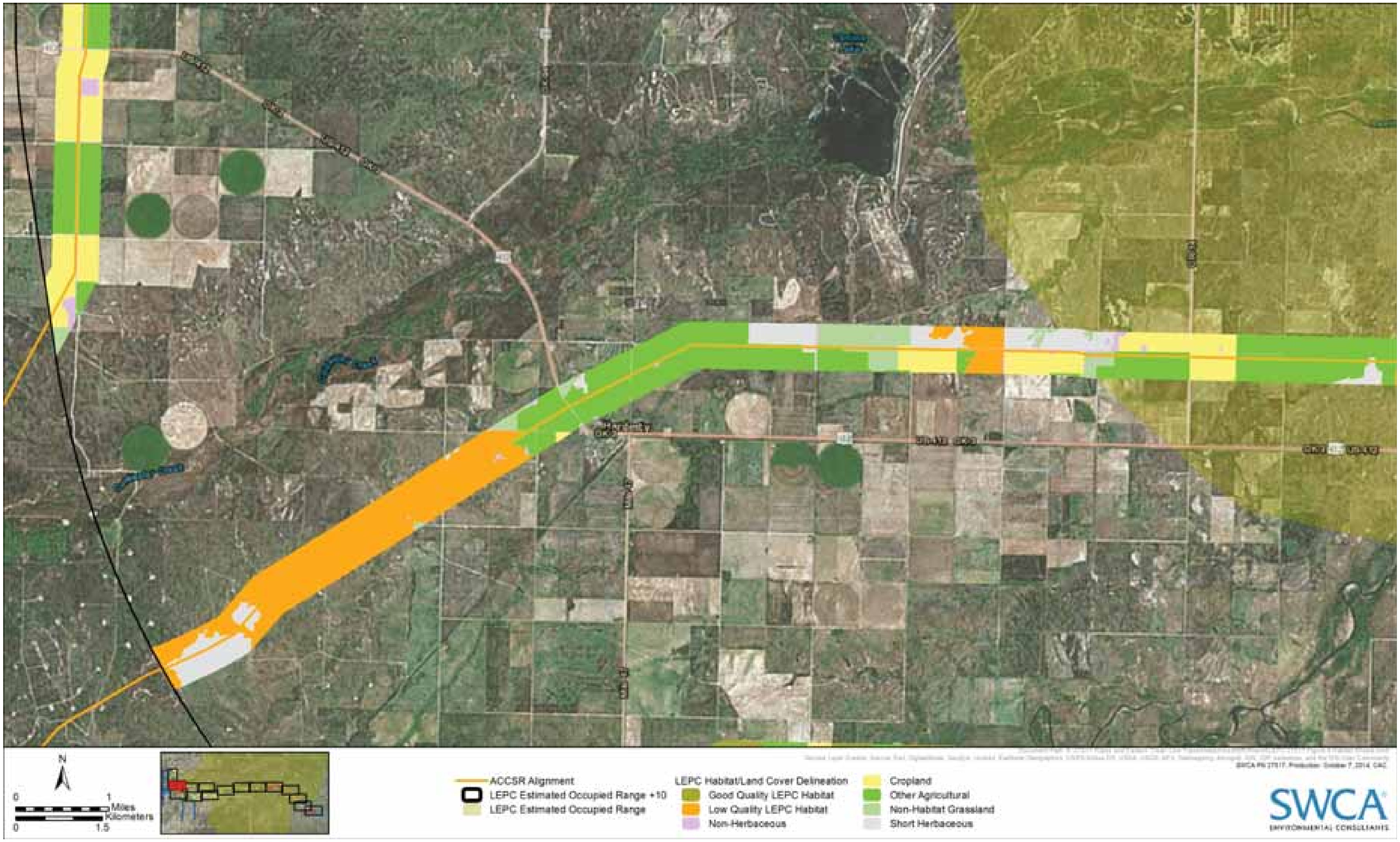

Figure 4.2. Landcover along the west side of a possible alignment for ACCSR Connector E1 on the west side of the Study Area, Texas County, Oklahoma

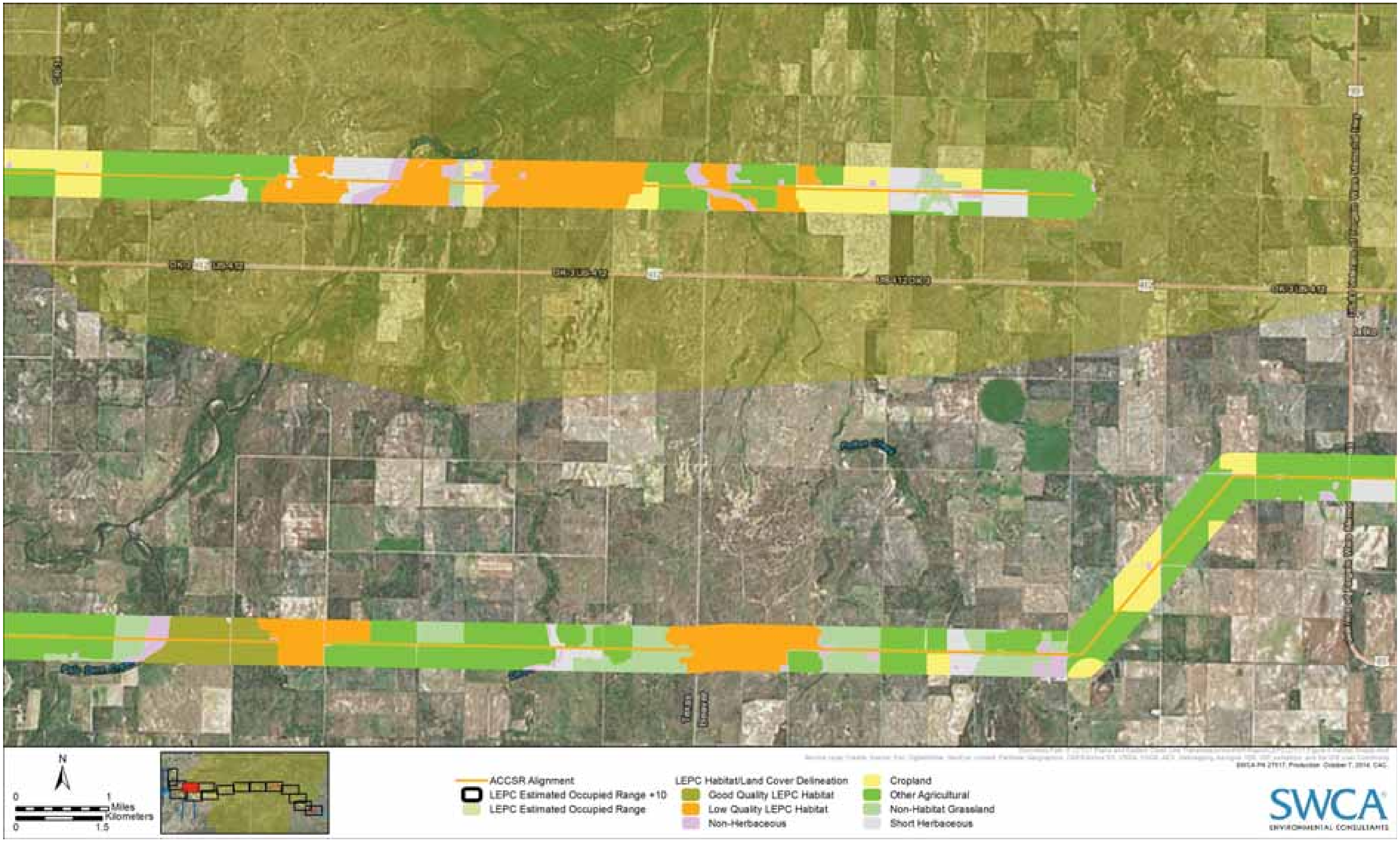

Figure 4.3. Landcover along possible alignments for the east side of ACCSR Connector E1 and the middle of Connector E3 on the west side of the Study Area, Texas County, Oklahoma

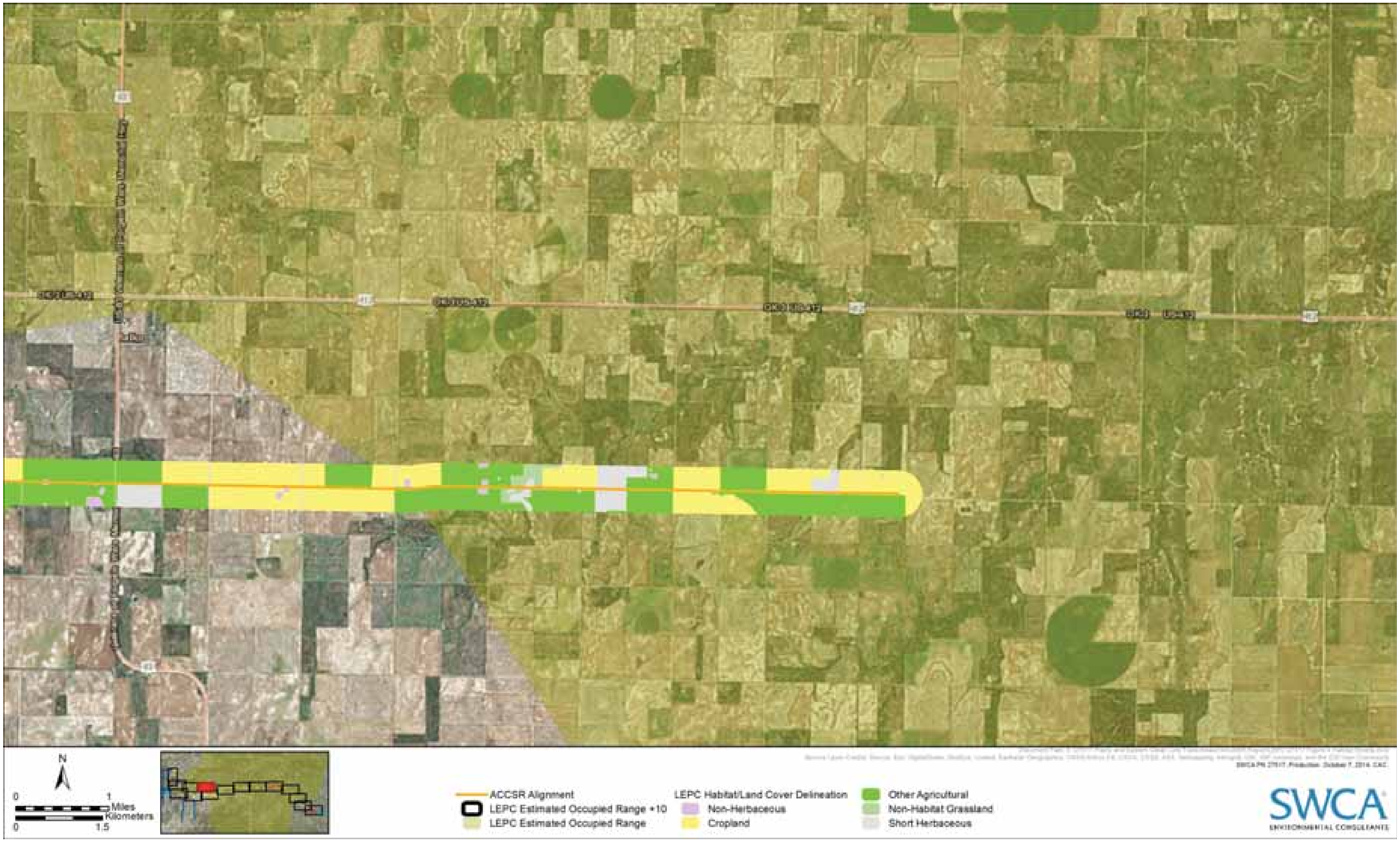

Figure 4.4. Landcover along the east end of a possible alignment for ACCSR Connector E3 on the west side of the Study Area, Texas County, Oklahoma

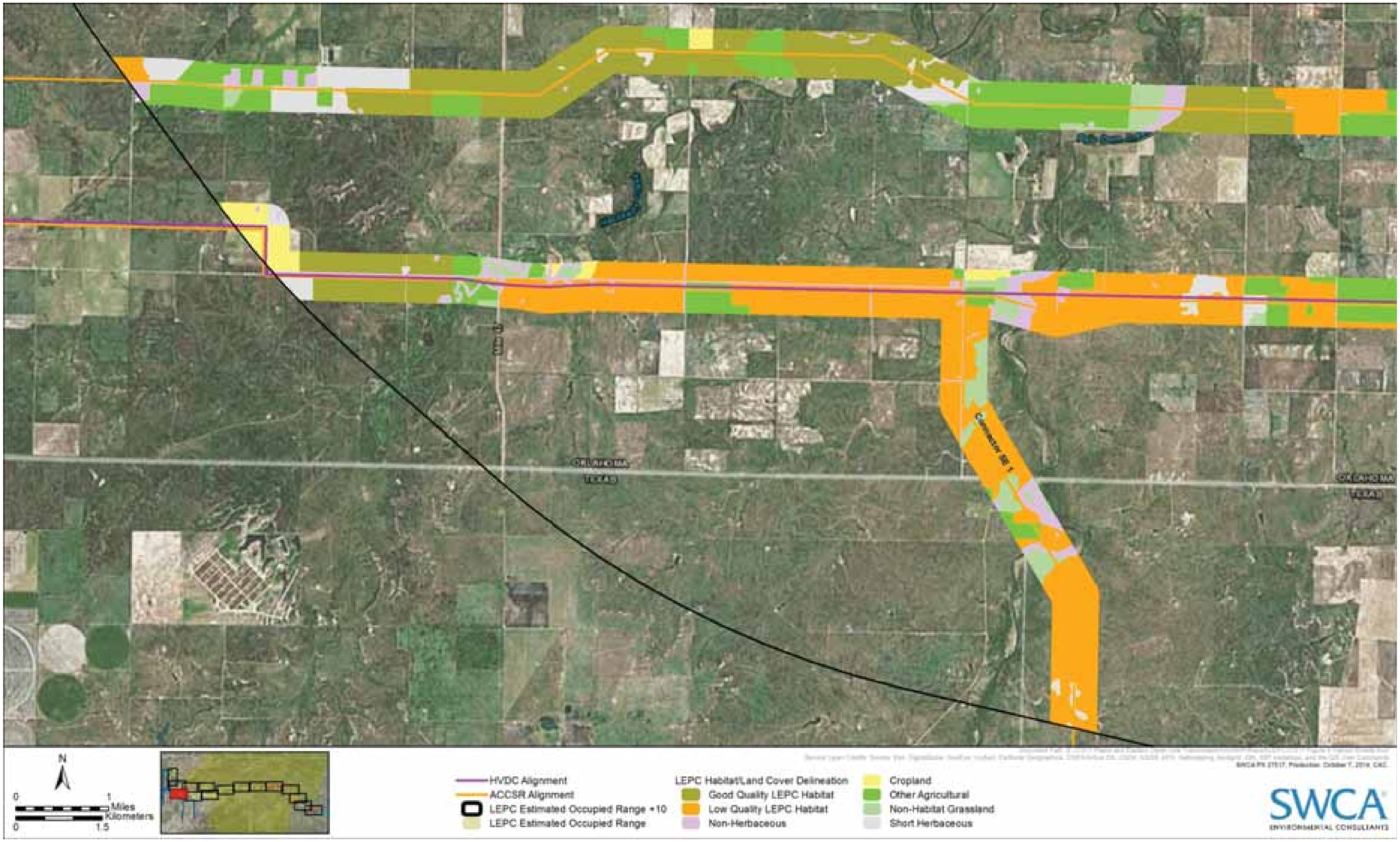

Figure 4.5. Landcover along possible alignment for the west side of the APR and segments of ACCSR Connectors E2, E3, SE1, and SE3, Texas County, Oklahoma, and Hansford and Ochiltree counties, Texas

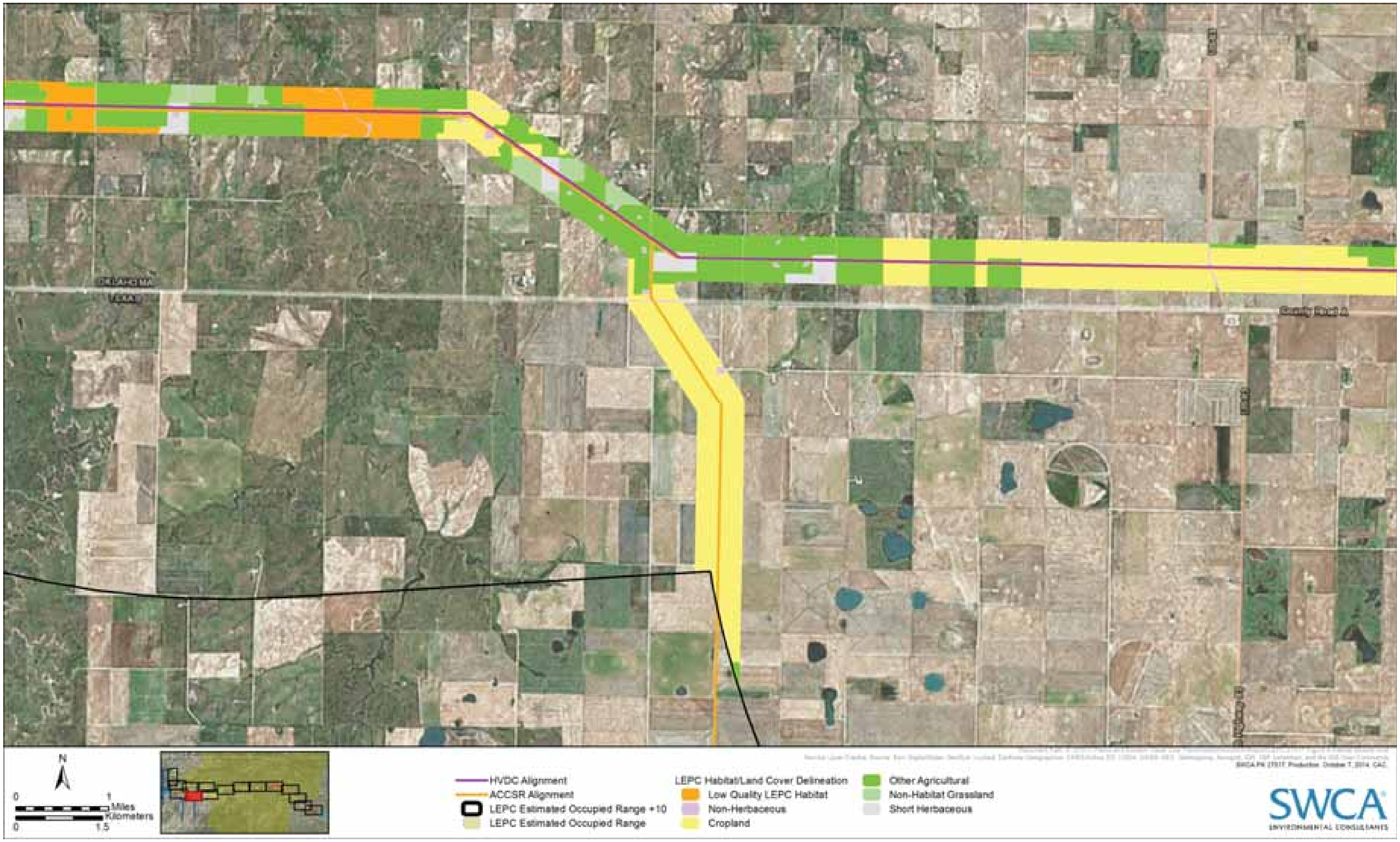

Figure 4.6. Landcover along the APR and a possible alignments for ACCSR Connectors E2 and SE3 on the west side of the Study Area, Texas and Beaver Counties, Oklahoma, and Ochiltree County, Texas

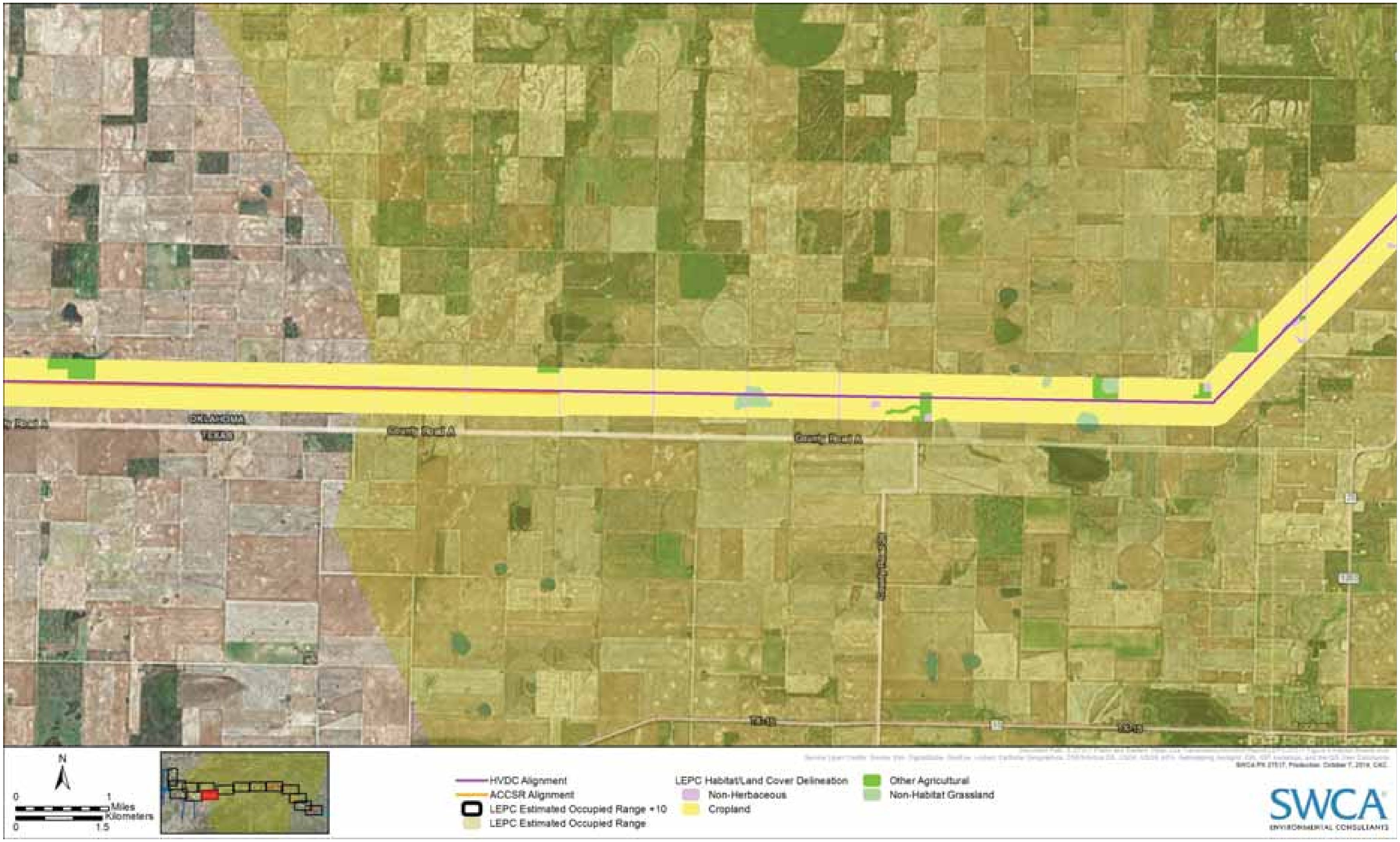

Figure 4.7. Landcover along the APR and eastern segment of a possible alignment for ACCSR Connector E2 on the west side of the Study Area, Beaver County, Oklahoma

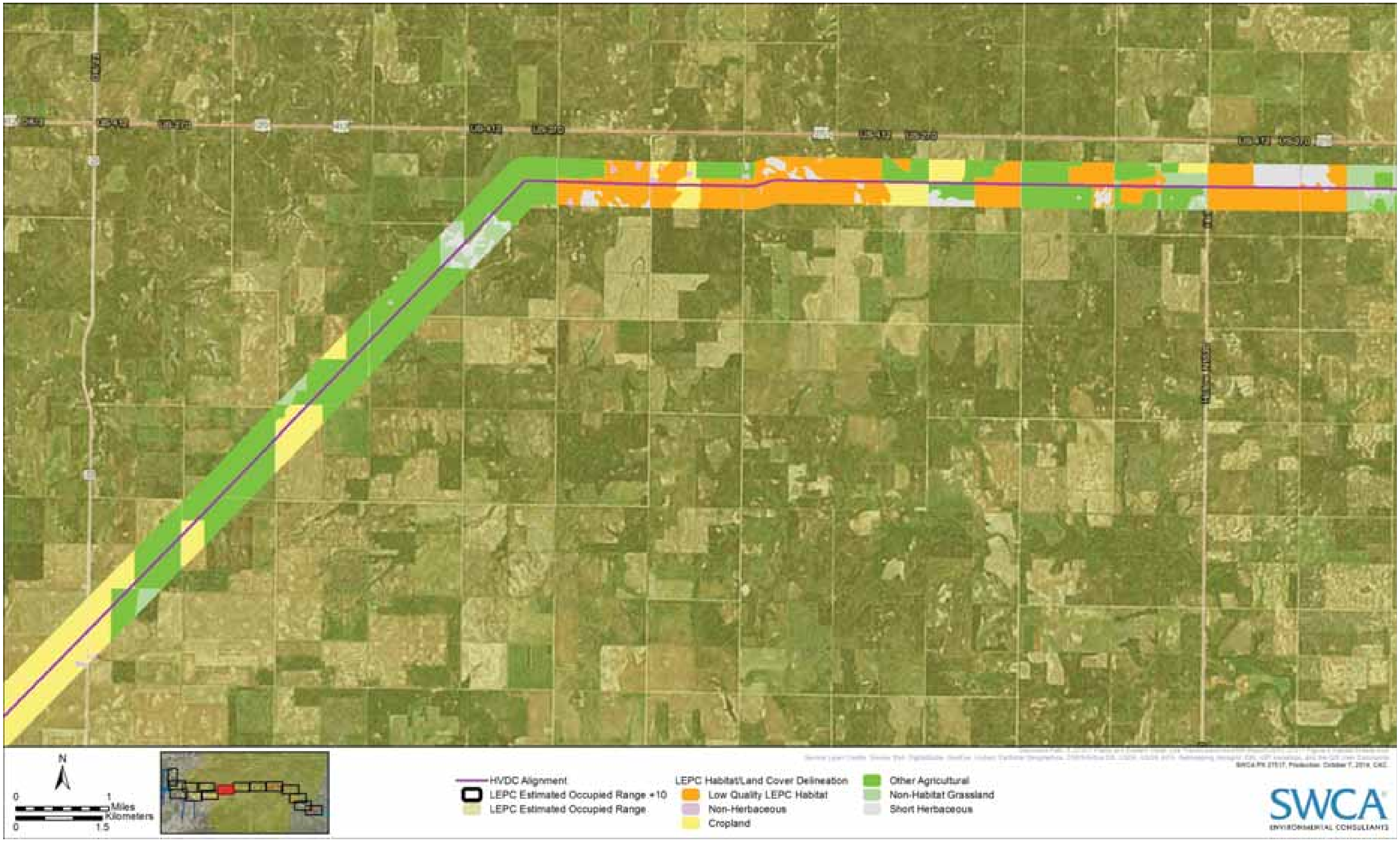

Figure 4.8. Landcover along the APR in the central portion of the Study Area, Beaver County, Oklahoma

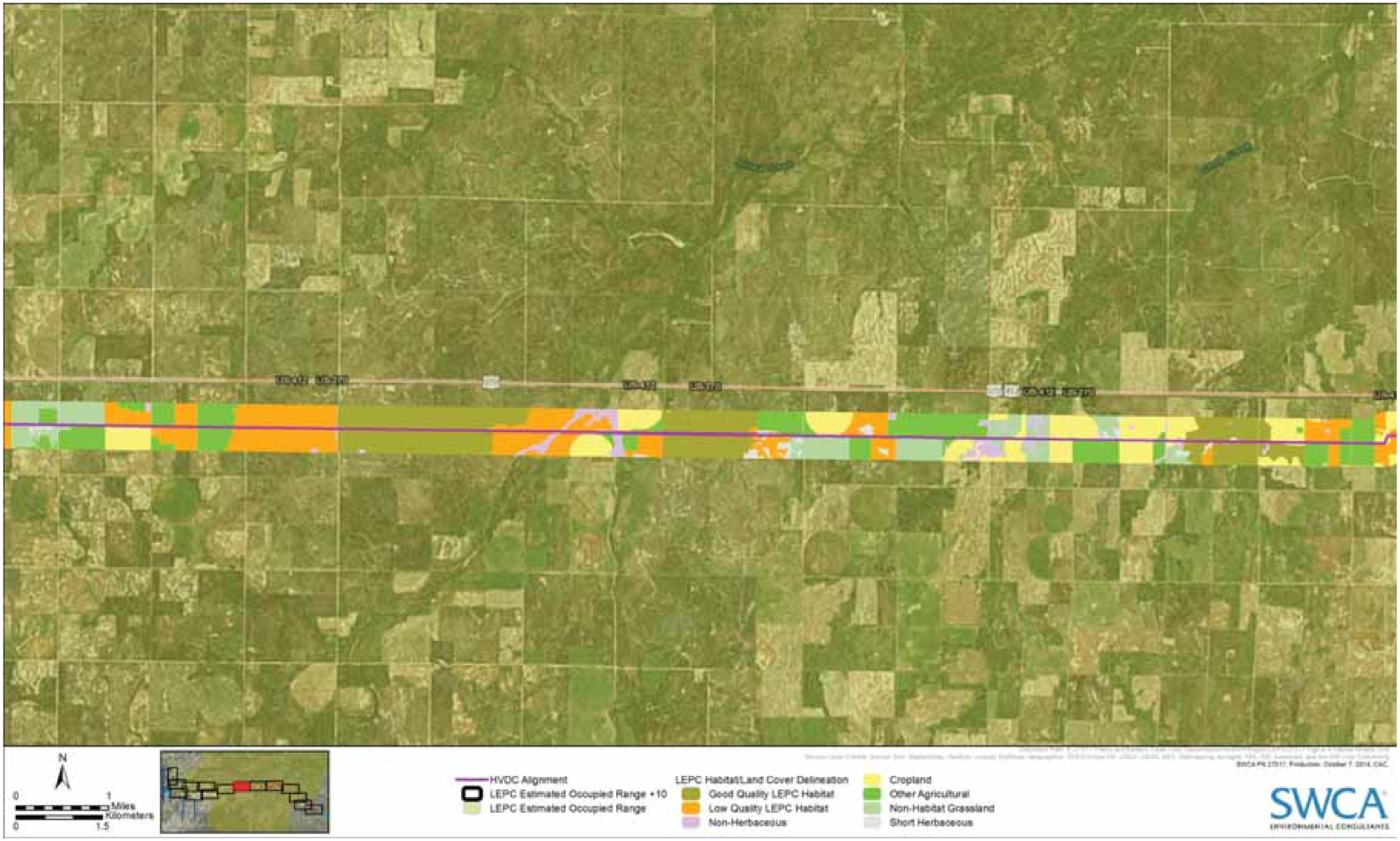

Figure 4.9. Landcover along the central portion of the APR in the central portion of the Study Area, Beaver County, Oklahoma

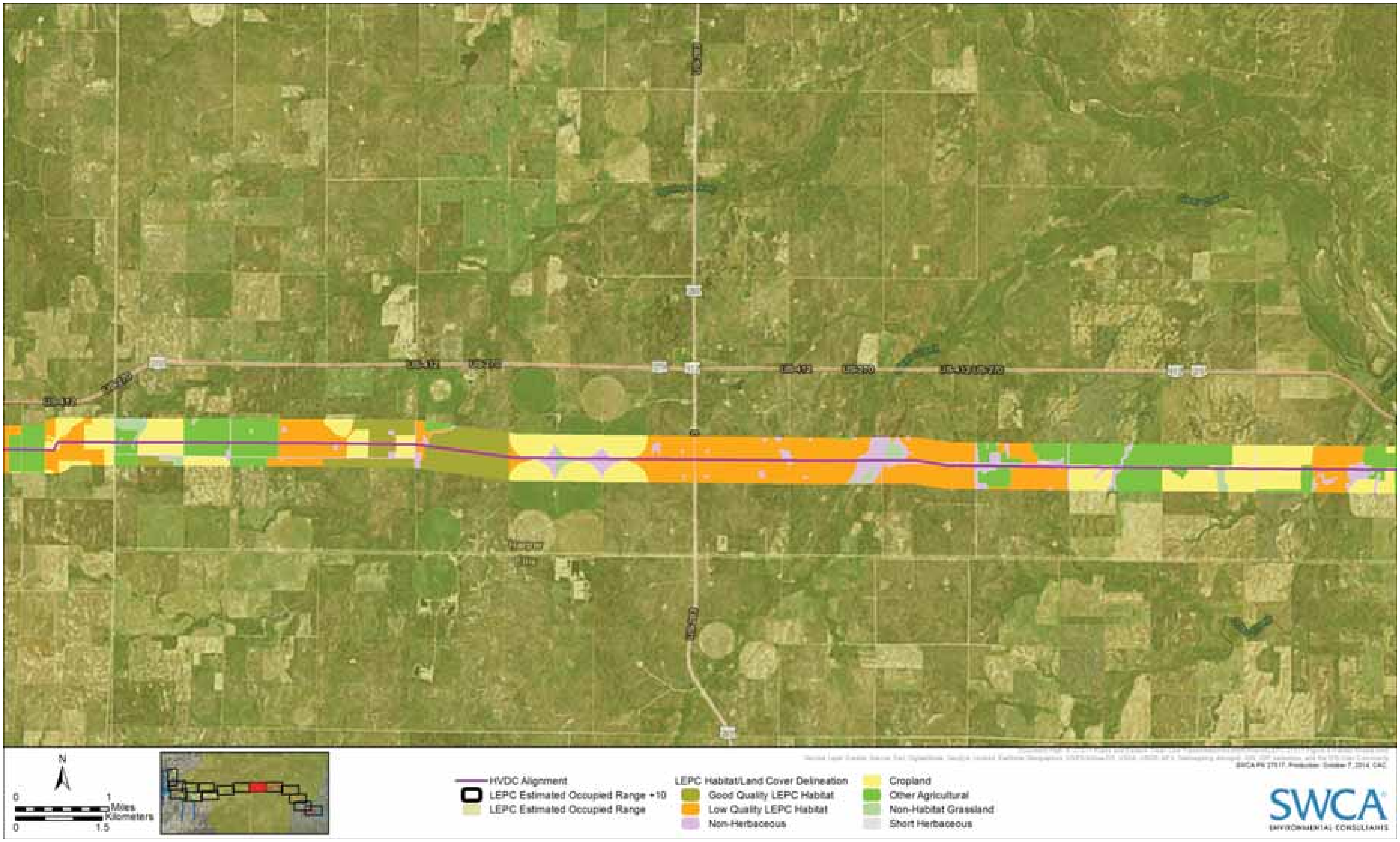

Figure 4.10. Landcover along the APR in the central portion of the Study Area, Beaver and Harper counties, Oklahoma

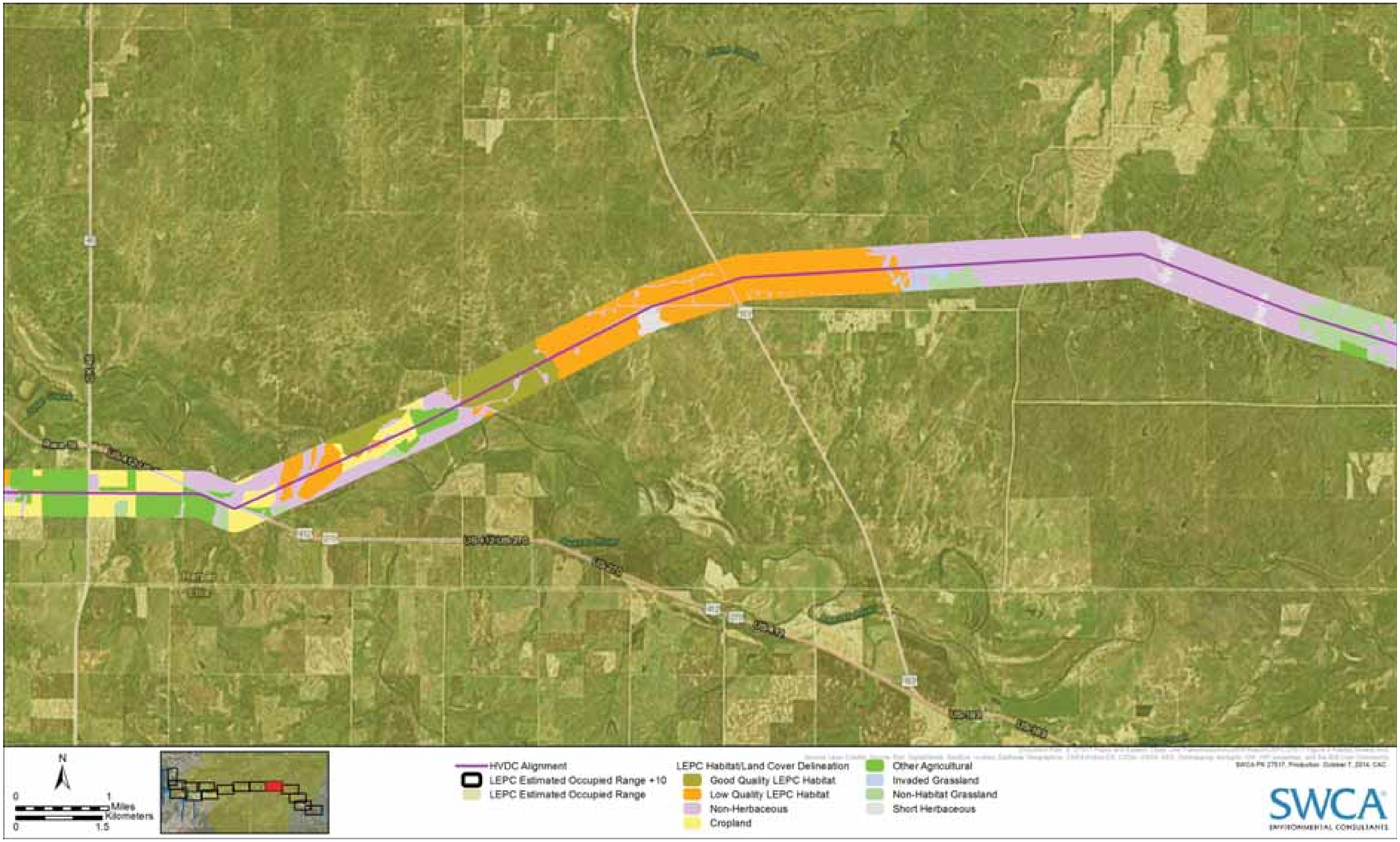

Figure 4.11. Landcover along the APR in the central portion of the Study Area, Harper County, Oklahoma

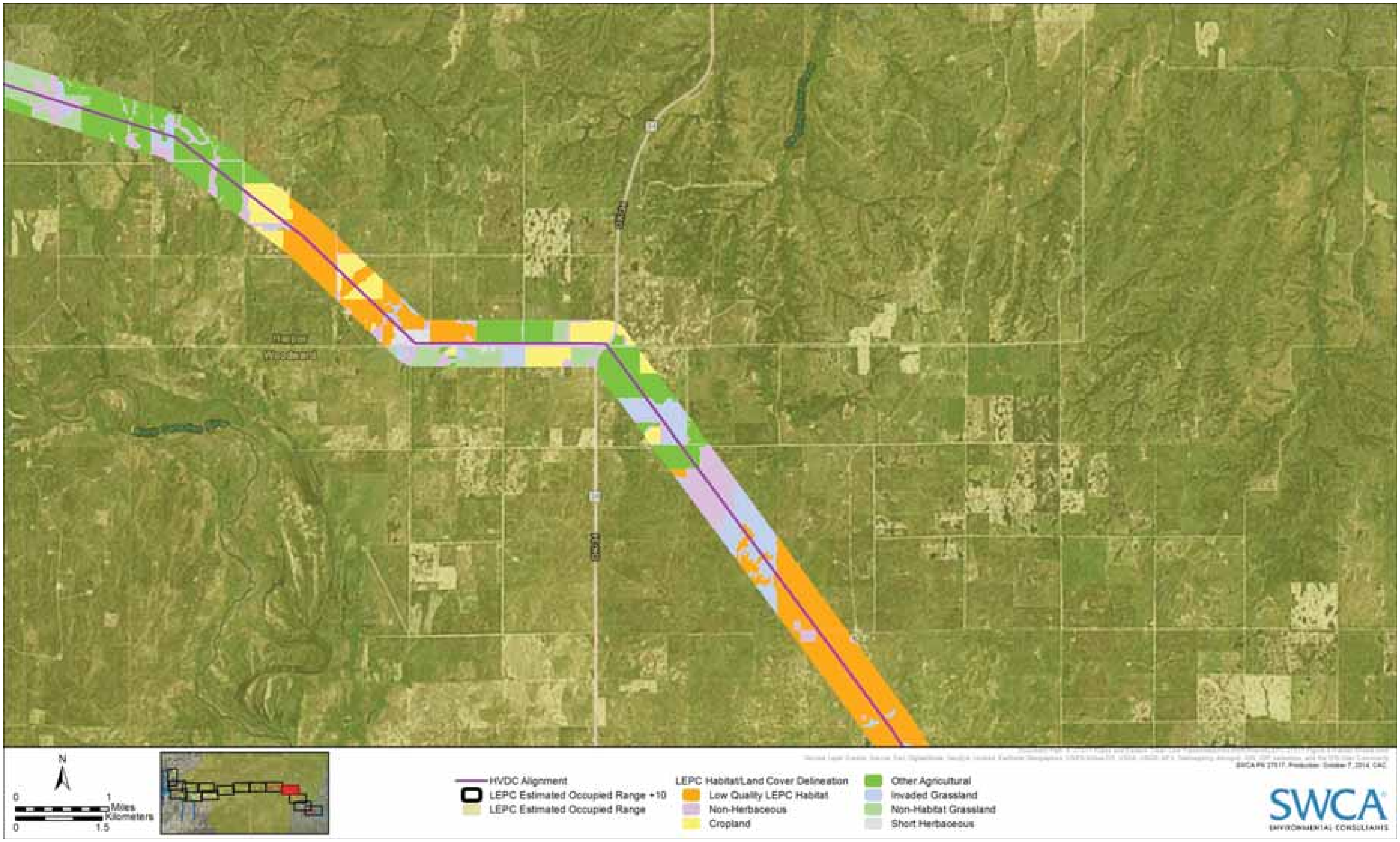

Figure 4.12. Landcover along the APR on the east side of the Study Area, Harper and Woodward counties, Oklahoma

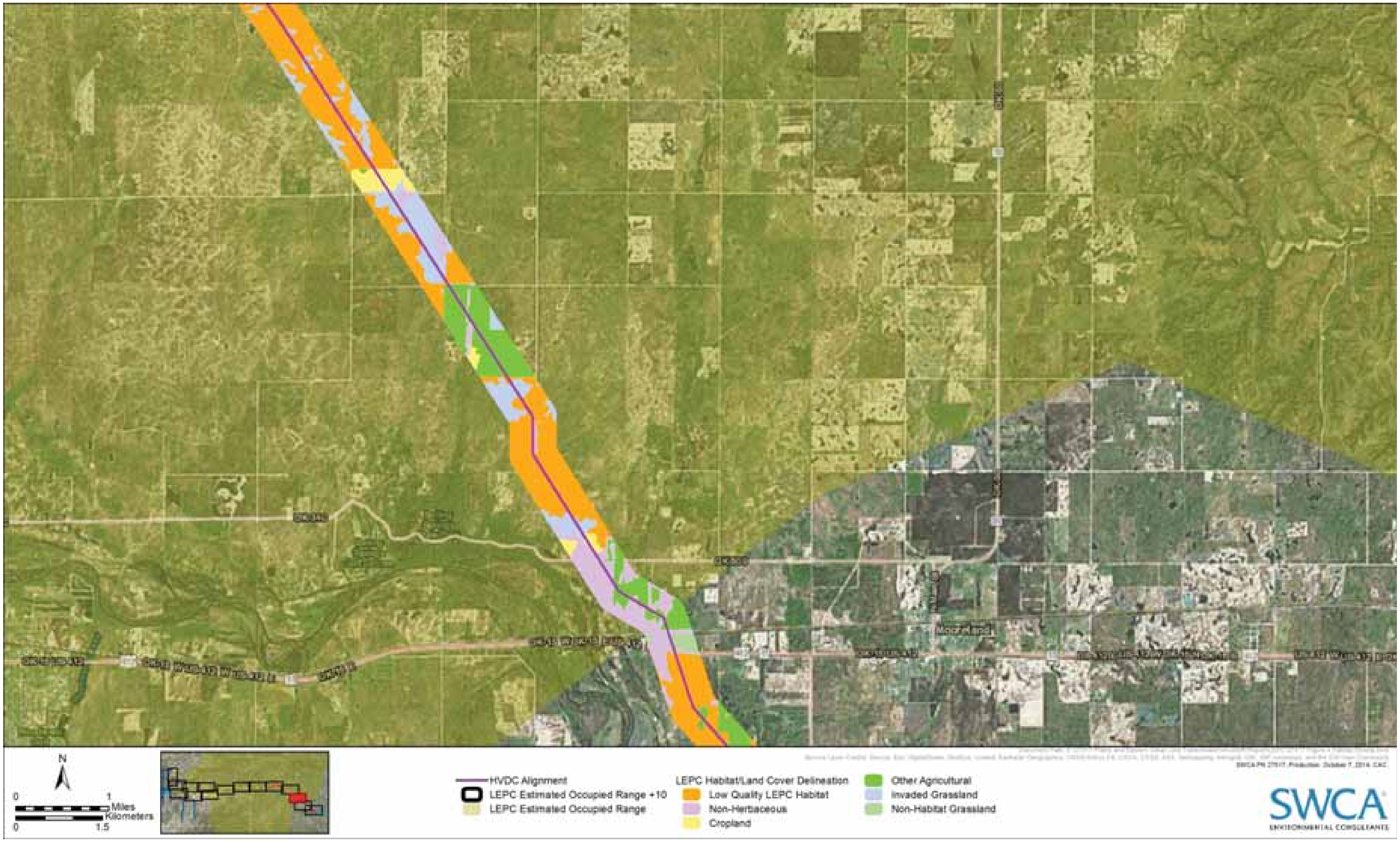

Figure 4.13. Landcover along the APR on the east side of the Study Area, Woodward County, Oklahoma

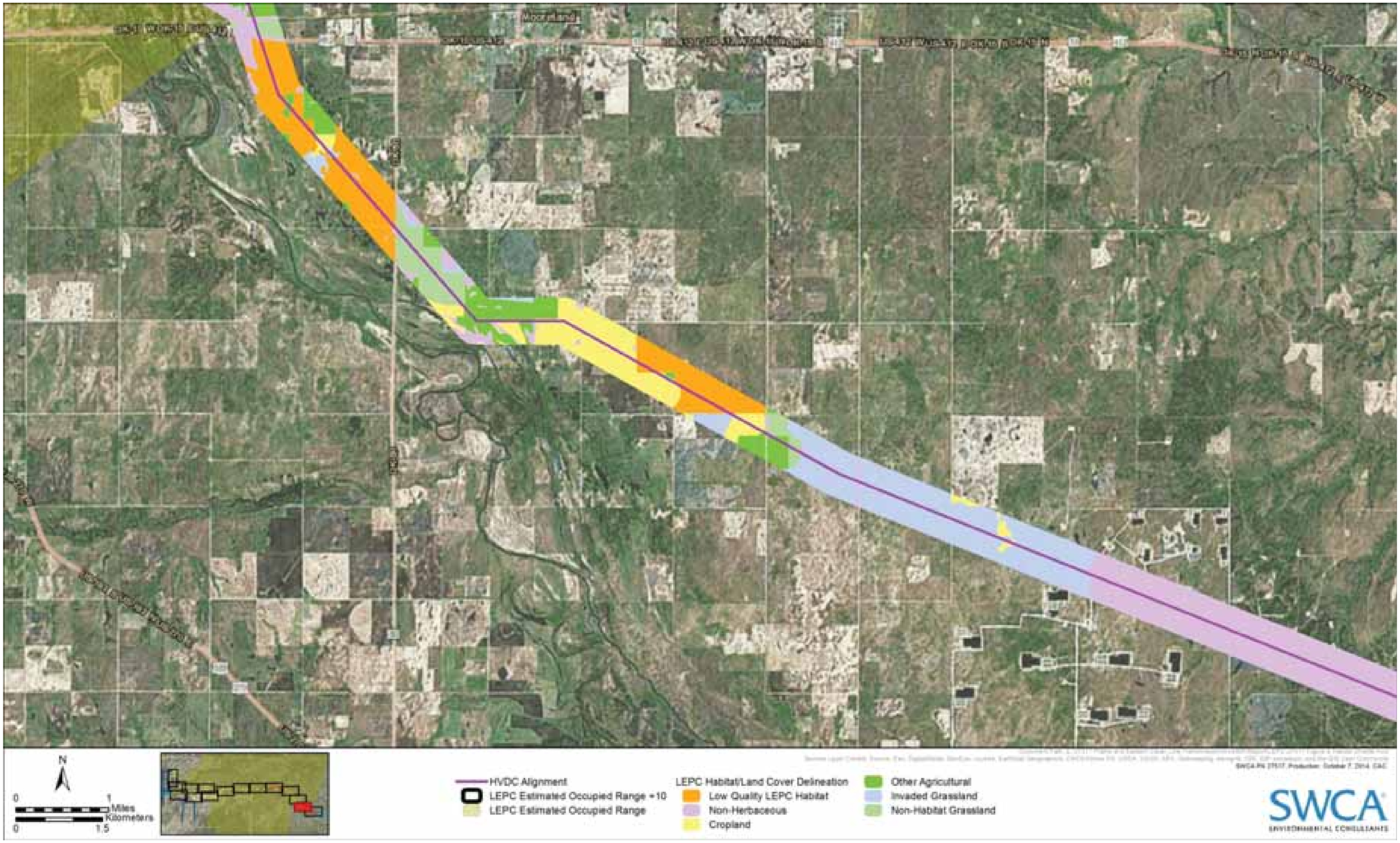

Figure 4.14. Landcover along the APR on the east side of the Study Area, Woodward County, Oklahoma

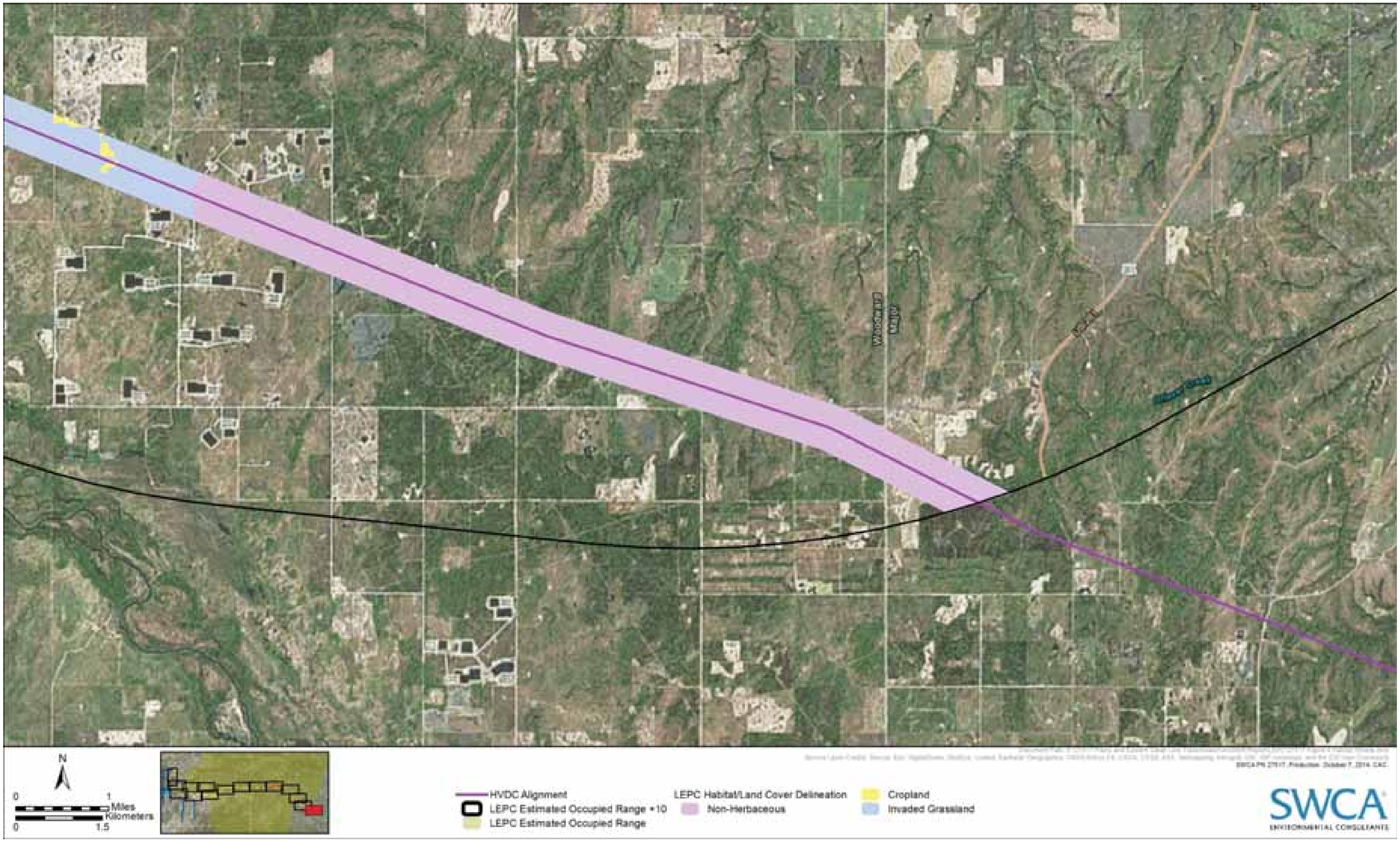

Figure 4.15. Landcover along the APR on the east side of the Study Area, Woodward County, Oklahoma

4.3 Known Status of Lesser Prairie-Chicken in the Study Area

The LEPC has been of conservation concern for several decades and has long attracted the attention of wildlife agencies and researchers, formerly because of its status as a gamebird and currently because of its status as a threatened species. The Oklahoma Department of Wildlife Conservation has performed and sponsored surveys for this species across most of its range in the state. Surveys for the LEPC are conducted in the spring when the birds are vocalizing at their leks. These vocalizations can be heard from a mile away or more, often making it feasible to conduct surveys for the species at points established along public roadways. As indicated, nearly the entire range of the LEPC in Oklahoma has been surveyed at least once for the species since 2009.

Fig. 5 depicts those portions of the Study Area that were surveyed for LEPC during the period of 2009-2013, and the locations of LEPC leks the CHAT website indicates were found during surveys conducted from 2008-2012. It is assumed that survey coverage shown as sets of parallel pink lines depict aerial transect routes, while survey coverage shown as pink squares or circles represent ground-based surveys. As shown on Fig. 5, lands in and surrounding the Study Area have been surveyed extensively for the LEPC. While the CHAT website indicates that all leks as depicted on Fig. 5 were active in the recent past, we wonder if some actually represent historical conditions and are no longer extant. We raise this question because the western-most lek crossed by the APR for the HVDC line as shown on Fig. 5 is located in an area that is almost completely cultivated and seemingly unsuitable for occupation by the species.

As also shown on Fig. 5, no LEPC leks are known to occur along any of the potential ACCSR routes considered in this assessment. The APR for the HVDC transmission line crosses through a region where LEPCs are known to occur in the southeastern quadrant of Beaver County and adjoining southwest corner of Harper County. No LEPC leks are known to occur in proximity to the APR to the east of southwestern Harper County. Given the intensity of recent survey coverage, SWCA believes that the lek locations shown on Fig. 5 provide a reasonable approximation of the current distribution of LEPC in region surrounding the Study Area.

4.4 Expected Distribution of Lesser Prairie-Chicken in the Study Area

Based on known information concerning the status of the LEPC in the Study Area as collected through nearly comprehensive surveys of the bird’s range in western Oklahoma and the results of our habitat assessment, it appears the APR traverses lands occupied by the LEPC as it crosses through the southeastern quadrant of Beaver County and the southwestern corner of Harper County. The APR through this region crosses some lands that appear highly suitable for use by LEPCs, as well as some lands that appear less suitable and some lands that are unsuitable for the species. Based on recent survey coverage, LEPCs are not known to occur along other segments of the APR for the HVDC line, nor along any of the ACCSR alignments.

Fig. 6 depicts with a red polygon the general area crossed by the APR that appears to be occupied by LEPCs based on the occurrence of known lek sites and suitable LEPC habitat. We have included in this polygon the western-most lek crossed by the APR despite the seeming unsuitability of habitat in the area for the species.

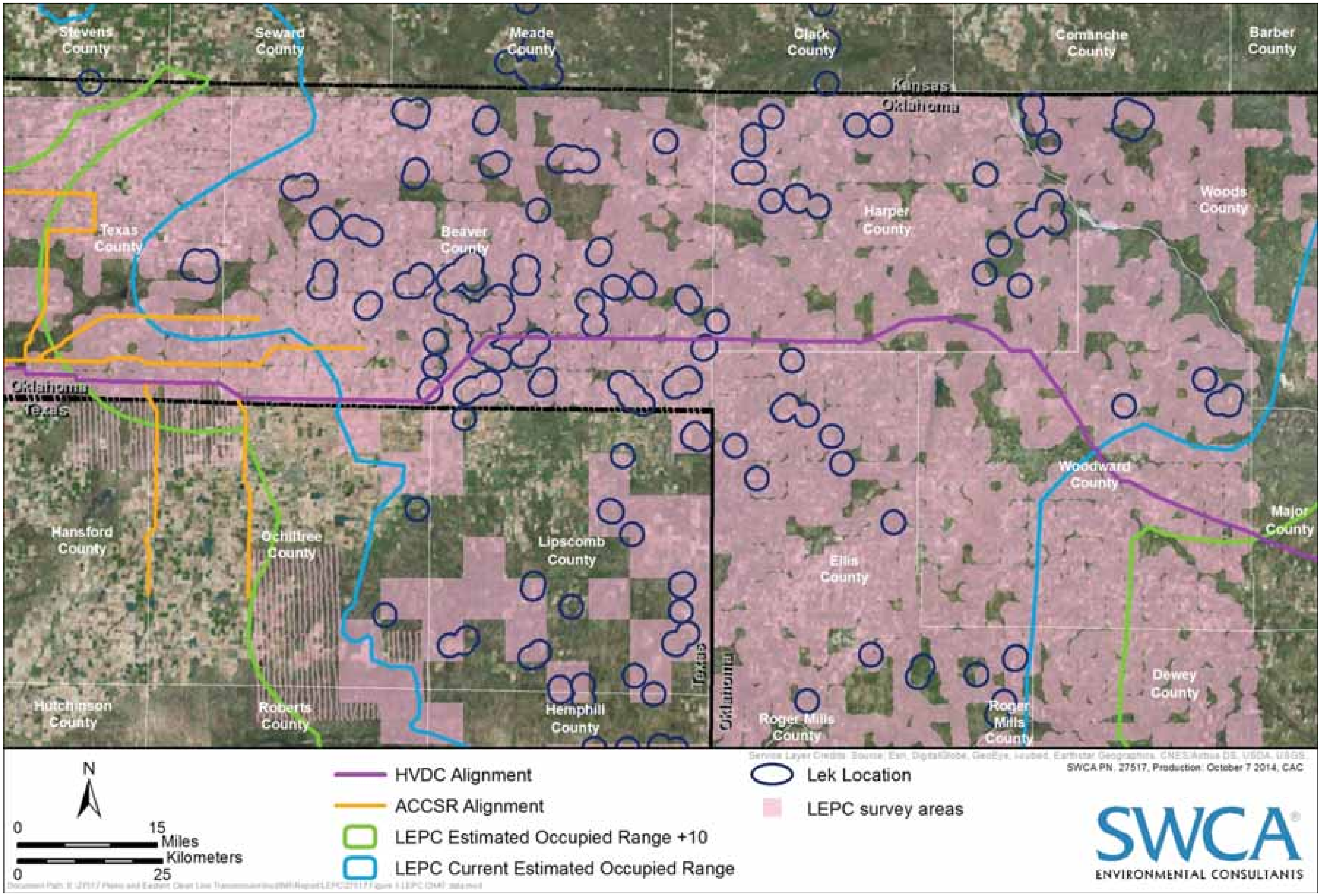

Figure 5. Lesser prairie-chicken survey coverage and location of lesser prairie-chicken leks in the Study Area

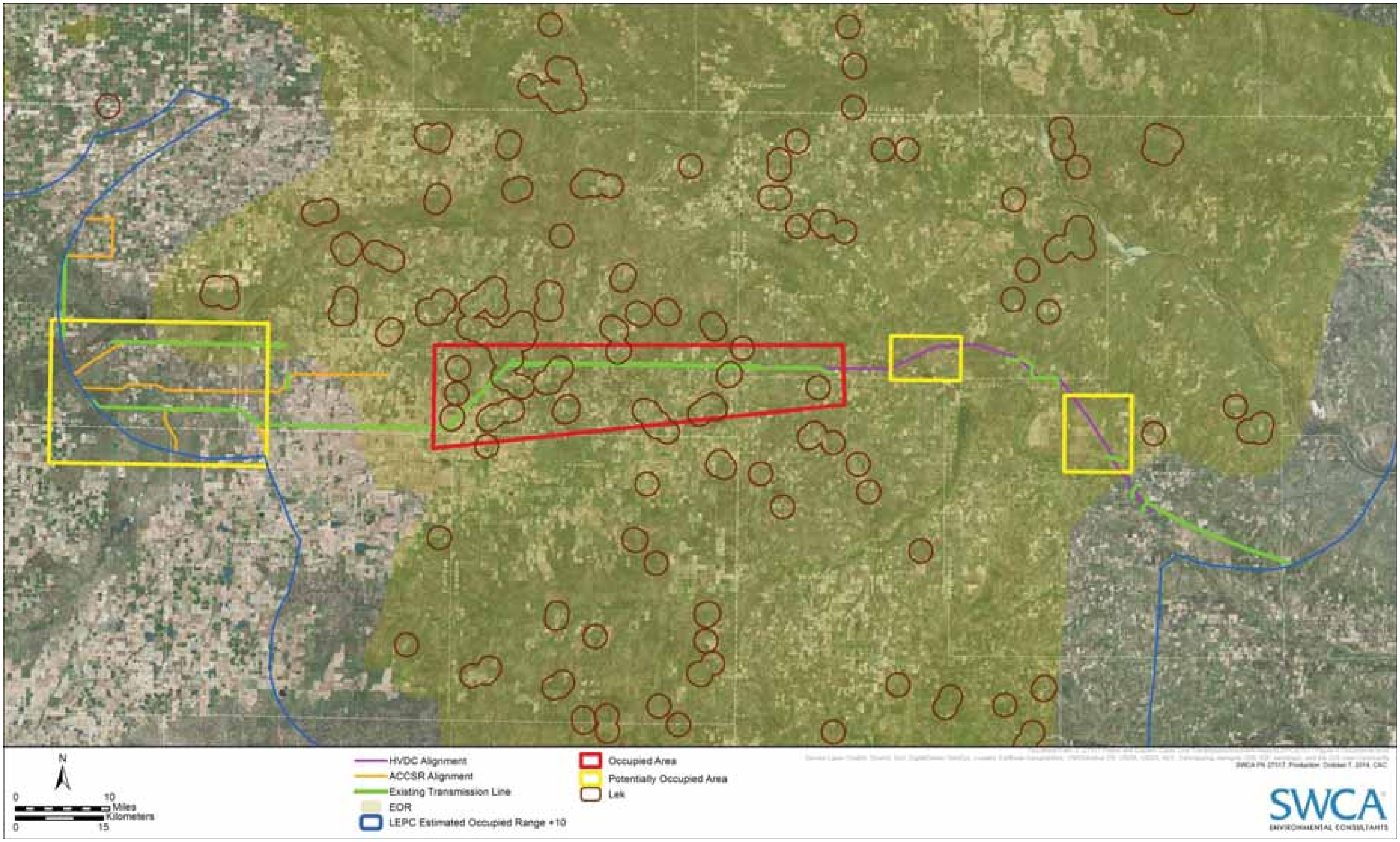

Figure 6. Known and potential occurrence of the lesser prairie-chicken in the Study Area

Fig. 6 also depicts the alignments of overhead transmission lines already present on the landscape in the Study Area. As can be seen on Fig. 6, the APR follows the alignment of one to two overhead transmission lines across the length of the area occupied by LEPCs in southeast Beaver County and adjoining southwest Harper County. These transmission lines are visible in some of the photographs used earlier in this report (Photos 2, 3 11, 12, 13, 14, and 18). For some of this length, the APR is situated between the two existing sets of overhead lines.

If LEPCs avoid transmission line structures as the scientific literature suggests, then the actual potential for LEPCs to occur in immediate proximity to the APR across the only section of the Study Area where LEPCs are known to occur should be very low owing to presence of the existing transmission lines. Based on the RWCP, areas adjacent to existing anthropogenic features, such as all lands occurring within 1,312 feet (400 meters) of the centerline of a > 69-kV transmission line, are consider previously impacted and are therefore not included in the calculations of impact credits or debits. The RWCP was endorsed by the USFWS, indicating the agency concurs that LEPCs typically avoid transmission lines by at least the 1,312-foot distance used in the RWCP.

Three yellow rectangles are also depicted on Fig. 6 to encompass lands we identified as Good or Low Quality LEPC Habitat that we believe may have some potential to support LEPCs despite the birds not having been found in those areas during the surveys represented by the survey coverage shown on Fig. 5. The potential habitat contained in the yellow rectangle directly east of the red polygon appears highly suitable for use by LEPCs and is part of a relatively unfragmented and nearly treeless block of grassland that covers more than 40,000 acres as measured using GIS software. In absence of knowledge of past survey results, we would have considered the probability that LEPCs occur in this area to be relatively high.

The potential for LEPCs to occur in the easternmost area enclosed by a yellow rectangle on Fig. 6 is believed to be low. Potential habitat identified in this area is part of a relatively large block of grassland, but much of it has been invaded to varying extent by eastern red cedar, and woody communities are relatively widespread across the greater landscape. The failure of surveys to detect LEPCs in this general area is not surprising. Note, however, the presence of one lek just to the east of this rectangle.

It appears that the potential for LEPC to occur in potential habitat encompassed by the westernmost yellow rectangle shown on Fig. 6 is also low given that much of that area was surveyed recently. However, extensive stands of sand sagebrush prairie occur in this area and much of it is relatively un-fragmented by roads. As before, we would have expected LEPCs to occur in some of this area in absence of knowledge of past survey results.

We consider it extremely unlikely that LEPCs occur in or in immediate proximity to the Study Area outside of the areas enclosed with red or yellow polygons on Fig. 6. Given the condition of habitat within the areas outlined with yellow rectangles, we suggest it may be prudent to conduct surveys in those areas to further demonstrate absence of the species from the identified potential habitat. No need may exist to conduct surveys within the area outlined by the red polygon as it seems necessary to consider habitat in that area as occupied by the LEPC given the results of past surveys. However, an updated survey in this area could demonstrate that leks are no longer present at some of the sites crossed by the APR as shown on Fig. 6 owing to the presence of the transmission lines followed by the HVDC alignment. SWCA does not know exactly when these lines were built, but one of the two lines appears on Microsoft 2010 World Imagery and the other does not. It is possible, therefore, that both lines were constructed after performance of the surveys that yielded the lek locations shown on Fig. 6.

5.0 SUMMARY AND CONCLUSIONS

The APR for the Plains & Eastern Clean Line crosses a region in southeastern Beaver County and adjoining southwestern Harper County, Oklahoma, where LEPCs are known to occur. The APR follows existing transmission line corridors across this area, so it is doubtful that LEPCs occur in immediate proximity to the centerline for the APR, if LEPCs avoid transmission line structures as suggested in the scientific literature. LEPCs are not known to occur, and may not occur, elsewhere along the alignment of the APR or along any of the associated ACCSR segments considered in this assessment.

A total of 15,475.3 acres of Low Quality LEPC Habitat and 4,391.4 acres of Good Quality LEPC Habitat were identified in the Study Area, which was defined as a 2,624-foot wide corridor centered on the centerlines of the proposed HVDC and ACCSR alignments. Of this, approximately 8,695.7 acres of Low Quality LEPC Habitat and 1,971.5 acres of Good Quality LEPC Habitat were identified in the Study Area within the LEPC EOR.

Potentially suitable habitat for the LEPC was identified rather commonly in the Study Area outside, but within 10 miles of, the EOR of the LEPC. This is not surprising given that all of the Study Area lies within the historical range of the species. No LEPCs were observed in the Study Area incidental to the habitat assessment. To the credit of the State of Oklahoma, surveys for LEPC have been conducted across nearly the entire potential range of the species in the state. Consequently, SWCA believes the boundary of the EOR in Oklahoma as mapped by the CHAT must be reasonably accurate. Nonetheless, because we do not know how recently all those surveys have been conducted, we believe additional surveys in areas outlined by yellow rectangles on Fig. 6 could be useful to further demonstrate that LEPCs do not occur in the potentially suitable habitat we have identified in those areas. Additional surveys in the area outlined in red on Fig. 6 may not be necessary as they may only further confirm that LEPCs do occur in this general area. However, surveys in this area could demonstrate that LEPC leks no longer occur in proximity to the APR of the HVDC line, as their locations as mapped on Fig. 6 suggest they might, owing to recent construction of transmission lines across this area.

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Appendix G
Whooping Crane Habitat Suitability Assessment Model

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Whooping Crane Habitat Suitability Assessment Model

for the

PLAINS & EASTERN
CLEAN LINE

October 2014

Pre-Decisional; Subject to Revision; Not for Public Distribution

Prepared for:

CLEAN LINE
ENERGY PARTNERS

Prepared by:

ecology and environment, inc.
Global Environmental Specialists

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Acronyms and Abbreviations

Clean Line	Clean Line Energy Partners LLC of Houston, Texas, parent company of Plains and Eastern Clean Line LLC and Plains and Eastern Clean Line Oklahoma LLC
DOE	United States Department of Energy
ESRI	Environmental Systems Research Institute
ft	feet
GIS	geographic information systems
HVDC	high-voltage direct current
km	kilometer
m	meter
mi	mile
NAIP	National Agricultural Imagery Program
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
Project, the	Plains & Eastern Clean Line transmission project
TWI	The Watershed Institute, Inc.
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service

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1.0 Introduction

Clean Line Energy Partners LLC of Houston, Texas, (parent company of Plains and Eastern Clean Line LLC and Plains and Eastern Clean Line Oklahoma LLC, which are two entities collectively referred to herein as "Clean Line") is proposing to construct, own, and operate the Plains & Eastern Clean Line transmission project (the Project) for the purpose of delivering renewable energy generated in the Oklahoma Panhandle region to load-serving entities in the Mid-South and southeastern United States via an interconnection with Tennessee Valley Authority. Further, the U.S. Department of Energy (DOE) is considering whether to participate in the Project pursuant to authority granted under Section 1222(b) of the Energy Policy Act of 2005. The DOE designated Clean Line as its non-federal representative for Endangered Species Act consultation pursuant to the Endangered Species Act Section 7.

The Project is an overhead ± 600 kilovolt high-voltage direct current (HVDC) electric transmission system and associated facilities with the capacity to deliver approximately 3,500 megawatts. The HVDC transmission line will transmit energy from the Texas County Converter Station in Oklahoma to the Shelby Converter Station in Tennessee. The HVDC transmission line will traverse approximately 721.5 miles, with approximately 428 miles in Oklahoma, 277 miles in Arkansas, and 16 miles in Tennessee.

This report was developed to assist Clean Line and the U.S. Fish and Wildlife Service (USFWS) to identify potentially suitable stopover habitats for the federally endangered whooping crane (*Grus americana*) within the vicinity of the Project through the use of a habitat suitability model. The USFWS recommended that Clean Line use a habitat suitability model developed by The Watershed Institute, Inc. (TWI), published in June 2013 and titled *Potentially Suitable Habitat Assessment for the Whooping Crane* (*Grus americana*) (TWI 2013). The whooping crane habitat suitability model discussed herein is based on TWI's model.

1.1 Scope

The USFWS recommends that proposed transmission line projects assess potentially suitable whooping crane stopover habitat within 1 mile of the project within the 95% whooping crane migration corridor as part of the project's avoidance, minimization, and mitigation decision process (USFWS 2010a). The 95% migration corridor (approximately 220 miles wide) includes 95% of the confirmed Aransas-Wood Buffalo whooping crane sightings from the 1940s through the spring of 2007. The USFWS confirms reported sightings and maintains this dataset. It is estimated that this dataset accounts for only 4% of the actual number of whooping crane stopovers per year (USFWS 2009a). However, it is the largest and most comprehensive dataset on whooping crane stopover locations available and represents the best available data regarding their distribution during migration (USFWS 2009a).

The USFWS broadly defines potentially suitable habitat for the whooping crane as "wetlands with areas of shallow water without visual obstructions" often located within 1 mile of grain fields and "submerged sandbars in wide, unobstructed river channels that are isolated from human disturbance" (USFWS 2010a). The Data Collection and Evaluation Plan to Support the Biological Assessment for the Plains & Eastern Clean Line (Clean Line 2014) was developed by Clean Line and the DOE in collaboration with the USFWS. In the data collection and evaluation plan, Clean Line and the DOE agreed to utilize a desktop model in consultation with the USFWS to determine suitable whooping crane stopover habitat within 1 mile of the Project area using existing desktop data. Clean Line agreed to apply the model within the 95% whooping crane migration corridor. Therefore, all potentially suitable whooping crane habitats within the 95% migration corridor and 1 mile of the Project were modeled to eliminate potential habitat and to identify areas of higher quality stopover habitat (see Figure 1-1).

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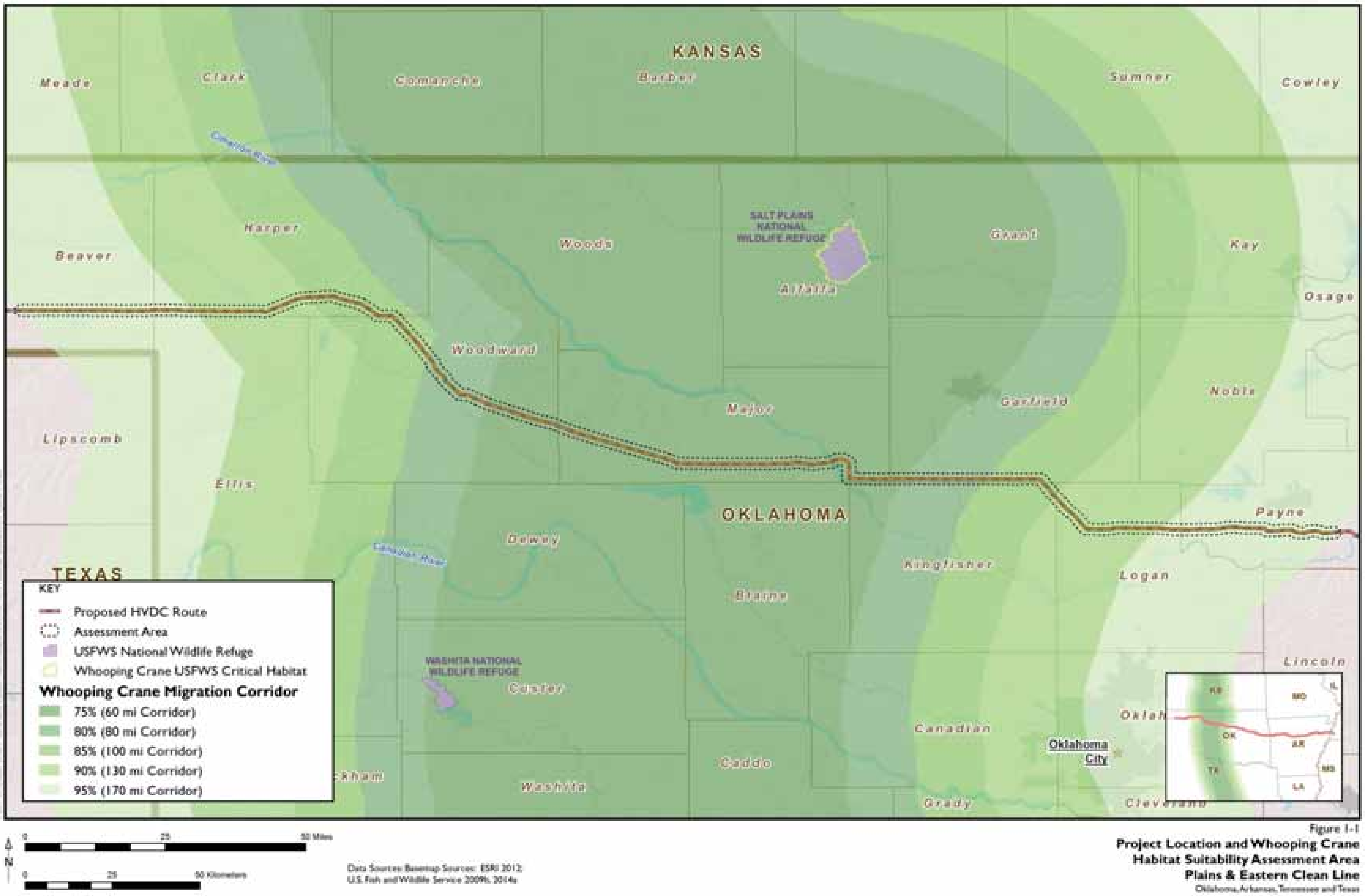

Data Sources: Basemap Sources: ESRI 2012; U.S. Fish and Wildlife Service 2009b, 2014a

Figure 1-1
Project Location and Whooping Crane Habitat Suitability Assessment Area
Plains & Eastern Clean Line
Oklahoma, Arkansas, Tennessee and Texas

2.0 Literature Review

The Watershed Institute, Inc. has developed methods for a geographic information systems (GIS)-based assessment of potentially suitable habitat for whooping cranes (TWI 2013). The Watershed Institute's goal was to provide electric utilities with reproducible, standardized methods to evaluate the quality of potential whooping crane habitat during the line marking decision process. First, this assessment identifies unsuitable whooping crane stopover habitat within the assessment area. Second, the assessment assigns habitat quality scores to stopover habitats that are suitable for whooping cranes, with habitats where whooping cranes are more likely to occur receiving higher scores. Third, the suitability scores are compared to a baseline developed from a reference site of known high quality whooping crane stopover habitat, such as Quivira National Wildlife Refuge (NWR) or Salt Plains NWR. The Watershed Institute, Inc. selected the habitat parameters necessary for their model through the recommendation of USFWS experts, USFWS guidelines (USFWS 2010a), and a literature review.

Based on the literature and expert opinion, TWI identified the characteristics of suitable whooping crane stopover roost habitat. The most important characteristic is that the roost is a wetland containing at least some water. These wetlands are then defined by water regime, wetland size, water depth/shoreline structure, horizontal visibility, proximity to human disturbances, distance to foraging habitat, and the presence of other wetlands in the immediate vicinity (TWI 2013). The literature describes suitable whooping crane habitat as follows. Whooping cranes:

- Will use riverine, lacustrine, and palustrine wetlands with semi-permanently flooded, intermittently exposed, permanently flooded, or artificially flooded water regimes;
- Will use wetlands of various sizes, but larger wetlands seem to be preferred;
- Prefer wetlands containing shallows that are less than 30 centimeters (11.8 inches) deep;
- Prefer wetlands without visual obstructions, presumably so they can see predators or disturbances from a distance;
- Avoid areas of human activity;
- Forage in crop fields and prefer roost wetlands that are near cropland; and
- Prefer areas with a high density of wetlands (especially family groups).

The literature used to define these characteristics is summarized in Appendix A.

The Watershed Institute, Inc. completed their model in June 2013. A search of the literature since June 2013 yielded one new reference relevant to modeling potentially suitable whooping crane habitat. Belaire et al. (2014) modeled predictors of suitability for whooping crane stopover habitat in the Aransas-Wood Buffalo migration corridor based on known whooping crane stopover locations. They included a predictor variable in their modeling, which they called "bearing." Bearing is the directional heading from a whooping crane stopover location to the whooping crane wintering grounds in Aransas NWR. Belaire et al. (2014) included this variable to incorporate the whooping crane's apparent tendency to adhere to a specific migration path, as described by Austin and Richert (2001). This path follows a relatively straight line connecting Aransas NWR in Texas, central North Dakota, and Wood Buffalo National Park in Canada. The USFWS modeled this path using confirmed incidental whooping crane sightings through 2007, creating the 95% migration corridor described in Section 1.2, "Scope." Belaire et al. (2014) found that bearing ranked as the highest variable in importance for predicting suitable whooping crane habitat.

Belaire et al.'s (2014) findings can be incorporated into TWI's habitat assessment model through the addition of a new parameter. The Watershed Institute, Inc. created their model to be relatively simple to apply to large projects. In this spirit, the new parameter scores wetlands based on their location within the 95% migration corridor. Wetlands in the center of the corridor will receive a higher score because, as whooping cranes have a tendency to adhere to their migration path as represented by the corridor, whooping cranes have a higher probability of occurring at wetlands in the center of the corridor. Similarly, wetlands further out from the center of the corridor have a lower probability of whooping crane use. This new parameter has been incorporated into the assessment model methodology outlined below and is further detailed in Section 3.4, "Habitat Suitability Scoring."

Belaire et al. (2014) also found that areas within 100 meters (m; 328 feet [ft]) of wetlands and <1 kilometer (km; 0.6 miles [mi]) of agricultural land were most likely to have the highest predicted suitability for whooping cranes. Areas of high agriculture, low road coverage, and intermediate wetland cover had higher predicted suitability. These findings are in accordance with the parameters selected by TWI for their assessment model and do not warrant any alterations to the model.

3.0 Assessment Model Methodology

The following methodology is closely based on TWI's habitat assessment model (TWI 2013), with three modifications. These modifications are the adjustment of the categorical divisions of criterion 2 – wetland size, the inclusion of wetlands less than 0.25 acres in the assessment, and the addition of criterion 6 – within corridor location. The rationale for these alterations is provided below. The habitat suitability assessment process involves four broad steps: (1) defining the assessment area, (2) eliminating unsuitable habitats, (3) assigning suitability scores to potentially suitable wetlands, and (4) defining suitable wetland baseline score using the model results from known preferred whooping crane habitat (Salt Plains NWR). Clean Line added an additional step to the assessment wherein confirmed whooping crane sighting data were compared with suitability scores of potentially suitable wetlands at Salt Plains NWR. The assessment modeling was conducted using Environmental Systems Research Institute's (ESRI's) ArcMap software (ESRI 2012).

3.1 Defining the Assessment Area

The first step of the model was to generate a 1-mile buffer on either side of the proposed HVDC power line within the 95% migration corridor. All subsequent steps in the assessment model were performed within this assessment area. The USFWS National Wetlands Inventory (NWI) layer (USFWS 2014b) was used for the base wetlands layer and was clipped to the assessment area. NWI wetlands within the assessment area were visually compared with U.S. Department of Agriculture (USDA) National Agricultural Imagery Program (NAIP) 2013 aerial photographs for accuracy (USDA NAIP 2013).

3.2 Unsuitable Habitat Screening

The next step in the habitat assessment modeling was to remove unsuitable habitat that whooping cranes are unlikely to use. Unsuitable habitat includes wetlands that are too close to human disturbances, have visual obstructions, or do not have suitable wetland shallows. The following steps were included in the unsuitable habitat screening:

1. Intermittent riverine streams, forested palustrine wetlands, shrub/scrub palustrine wetlands, and excavated wetlands (USFWS 2010b) were removed from the dataset based on NWI classifications (Cowardin et al. 1979). These wetlands were removed because they most likely have poor horizontal visibility, as described by Stahlecker (1997).
2. Disturbance buffers were generated around human disturbances using the distances recommended by Armbruster and Farmer (1981) as adapted by Armbruster (1990) for whooping cranes (see Table 3-1, "Human Disturbance Distances"). Publically available datasets and datasets delineated by Clean Line for the Project were used. Potential human disturbances were digitized from NAIP 2013 aerial photographs and ESRI base imagery as needed where data were lacking from other sources. GIS information on the locations of transmission lines was available for the modeling, but information on the locations of distribution lines (power lines) was not available for the assessment area. Distribution lines are generally located parallel with roads and therefore would be encompassed within the road buffers.
3. Wetlands within the disturbance buffers were eliminated from the dataset. Wetlands partially within the disturbance buffers were clipped, and their area was re-calculated. In their model, TWI eliminated wetlands less than 0.25 acres. The literature shows that whooping cranes will use wetlands of various sizes and does not provide a lower limit for wetland size (Howe 1989; USFWS 2009a). Wetlands less than 0.25 acres were retained during this modeling process with

the assumption that wetlands that are poor whooping crane stopover habitat were identified during the habitat suitability scoring outlined in Section 3.2, "Habitat Suitability Scoring," which includes a variable for wetland size.

4. Remaining wetlands were visually inspected by a bird biologist using 2013 NAIP aerial photographs and ESRI base imagery for visual obstructions such as trees, buildings, topography, etc. Wetlands with these types of obstructions within 100 m (328 ft) of the wetland's centroid were eliminated (Armbruster 1990). Elongated wetlands and wetlands large enough that the majority of the shoreline was >100 m from visual obstructions were retained in the dataset. Wetlands within 100 m of one to three trees but otherwise free of visual obstructions were also retained in the dataset. Narrow stock ponds, excavated pits, or steep-sided ponds were removed because they likely did not have suitable shallows (TWI 2013). Wetlands that appeared grossly misrepresented by the NWI dataset when compared to aerial imagery from several sources were re-delineated at a scale of 1:3,000.

Table 3-1
Human Disturbance Distances

Type of Disturbance	Width of Affected Area[1]
Private Road	100 m (328 ft)
Power Lines	100 m (328 ft)
Gravel Road	200 m (656 ft)
Rural Dwelling	200 m (656 ft)
Recreational Area[2]	200 m (656 ft)
Paved Road	400 m (1,312 ft)
Railroad	400 m (1,312 ft)
Bridges	400 m (1,312 ft)
Urban Dwelling[3]	800 m (2,624 ft)
Commercial Development[4]	800 m (2,624 ft)

Notes:

(1) Width of a band on one side of a linear feature or the radius around a point (Armbruster and Farmer 1981 as adapted by Armbruster 1990).

(2) State and city parks, wildlife management areas open for hunting, etc.

(3) Buildings within municipalities.

(4) Wind facility structures, oil development structures, commercial livestock feeding facilities, etc.

3.3 Habitat Suitability Scoring

After the removal of unsuitable wetlands from the dataset, the remaining potentially suitable wetlands were ranked in suitability using a scoring system including six criteria. These criteria include the parameters most frequently identified in the literature as important descriptors of preferred whooping crane habitat. The highest score a wetland can receive (the most suitable whooping crane habitat) is 36. The lowest score a wetland can receive (the least suitable habitat) is 5. The total suitability score for each wetland was compared with a baseline to determine the threshold at which a wetland was considered quality whooping crane stopover habitat (see Section 3.4).

Criterion 1: Wetland Regime

Whooping cranes will use riverine, lacustrine, and palustrine wetlands with either semi-permanently flooded, intermittently exposed, permanently flooded, or artificially flooded water regimes. The more permanent the wetland, the more reliably available it will be to whooping cranes (Armbruster 1990). Thus, more permanent wetlands received a higher suitability score, which is a conservative measure of roost-site availability (see Table 3-2, "Criterion 1: Wetland Regime Suitability Score"). These classifications are based on the Cowardin et al. (1979) classification system and are already incorporated into the NWI dataset.

Table 3-2
Criterion 1: Wetland Regime Suitability Score

Wetland Regime[1]	Score[2]
Permanent (H)	5
Intermittently Exposed (G)	4
Semi-Permanent (F)	3
Seasonally Flooded (C)	2
Intermittent/Temporarily Flooded (J/A)	1

Notes:
(1) Nontidal Water Regime from Cowardin et al. (1979).
(2) Based on TWI 2013.

Criterion 2: Distance to Foraging Habitat

Whooping cranes feed in crop fields, specifically, harvested cereal grain fields (Johns, Woodsworth, and Driver 1997). The closer a roost is to crop fields, the more desirable it will be because whooping cranes can spend less time and energy traveling between the two. Armbruster (1990) assumed that food must be within 1.5 km (0.9 mi) of a roost site for optimum conditions. The Watershed Institute, Inc. adopted this distance as their lowest suitability score and ranked wetlands in or adjacent to foraging habitat with the highest suitability score (see Table 3-3, "Criterion 2: Distance to Foraging Habitat Suitability Score"). Cropland habitat was identified using the U.S. Geological Survey 2011 National Land Cover dataset (Jin et al. 2013).

Table 3-3
Criterion 2: Distance to Foraging Habitat Suitability Score

Distance to Foraging Habitat	Score[1]
Within or Adjacent to Crop Field	5
< 0.5 km (<0.3 mi)	4
0.6 - 1.0 km (0.4 – 0.6 mi)	3
1.1 - 1.5 km (0.7 – 0.9 mi)	2
> 1.5 km (>0.9 mi)	1

Note:
(1) Based on TWI 2013.

Criterion 3: Wetland Size

Whooping cranes use a range of wetland sizes, and the literature is inconclusive as to the optimal wetland size they prefer. Whooping cranes use stopover habitat opportunistically and may select the best wetland that is available when they stop to rest, roost, and/or feed, regardless of size (USFWS 2009a). The Watershed Institute, Inc. did not provide a rationale for their wetland size habitat scoring categories. Therefore, categories for scoring wetland size have been changed to reflect the best available data, particularly relative to the numbers of whooping crane observations documented in wetlands of certain size groups. The USFWS (2009a) indicated that 75% of roost wetlands were less than 10 acres and 40% were less than 1.24 acres. Howe's (1989) research showed that approximately 52% of tagged whooping cranes used roost sites less than 2.5 acres. Based on these numbers, wetlands greater than 10 acres were assigned the highest score (5) (see Table 3-4, "Criterion 3: Wetland Size Suitability Score"). The lowest score (1) was assigned to wetlands less than an acre, per Armbruster's (1990) assumptions on the value of wetland of that size range. Similarly, a value of 2 was assigned to wetlands between 1 and 2.5 acres, as Armbruster (1990) stated that optimum conditions for stopover wetlands begin at 2.5 acres. The assigned values are relatively proportional to the data reported by USFWS (2009a) and Howe (1989). For example, a 10-acre wetland would have a score of 4 and would have twice the suitability of a wetland of 1.24 acres with a score of 2. Similarly, about twice as many observations of whooping cranes have been recorded in wetlands up to 10 acres (75% of the total) than in wetlands up to 1.24 acres (40% of the total).

Table 3-4
Criterion 3: Wetland Size Suitability Score

Wetland Size	Score
> 10 acres	5
5.1 - 10 acres	4
2.6 - 5 acres	3
1 - 2.5 acres	2
< 1 acre	1

Criterion 4: Natural Wetland

Water depth is an important element to whooping crane habitat preferences. There are no direct means of determining wetland depth as part of a desktop GIS assessment. Therefore, TWI assumed that naturally occurring wetlands would have shallower water and would be more attractive to whooping cranes. Thus, they gave natural wetlands a higher habitat quality score than created wetlands (TWI 2013; see Table 3-5, "Criterion 4: Natural Wetland Suitability Score"). Human-made palustrine wetlands also lack the high quality whooping crane habitat features of naturally-occurring wetlands, such as gentle slopes, shallow water, and unobstructed views (Stahlecker 1992, 1997). Created wetlands were identified using special modifiers listed as part of the NWI dataset. These special modifiers are diked/impounded (h) and artificial (r) (USFWS 2010b). Excavated wetlands were removed during the unsuitability screening.

Table 3-5
Criterion 4: Natural Wetland Suitability Score

Wetland Type	Score[1]
Natural	2
Created	0

Note:
(1) Based on TWI 2013.

Criterion 5: Wetland Density

Johns, Woodsworth, and Driver (1997) found that whooping cranes, especially family groups, seemed to prefer wetlands that are part of a wetland mosaic, although this trend was not statistically significant. The Watershed Institute, Inc. considered a wetland mosaic as five or more wetlands within the same quarter-section with no visual obstructions between them (TWI 2013). The Watershed Institute, Inc. scored wetlands within a mosaic with a value of 3 based upon expert opinion. A wetland mosaic is thought to be more visible to migrating whooping cranes and thus more likely to attract them as they search for a roost at the end of the day (Emmert 2014). Potentially suitable wetlands within the same quarter-section as four or more potentially suitable wetlands were given a score of 3 (see Table 3-6, "Criterion 5: Wetland Density Suitability Score").

Table 3-6
Criterion 5: Wetland Density Suitability Score

Wetland Mosaic[1]	Score[2]
Yes	3
No	0

Note:
(1) Five or more wetlands within a quarter section.
(2) Based on TWI (2013).

Criterion 6: Within Corridor Location

Belaire et al. (2014) found that bearing ranked the highest in variable importance for predicting suitable whooping crane habitat, more so than variables of wetland and agriculture cover and proximity of wetlands to agricultural lands. Similarly, Austin and Richert (2001) noted that whooping cranes have an apparent tendency to adhere to a specific migration path, which has been modeled by the USFWS (Figure 1-1). Given the strength of the influence this migration corridor has on the selection of stopover habitats, Criterion 6 is weighted more heavily than the other criteria, specifically in the center of the corridor (see Table 3-7, “Criterion 6: Within Corridor Location Suitability Score”). Seventy-five percent of all confirmed whooping crane sightings have been documented within 40 miles of the centerline of the migration corridor, while only 20% have been documented at distances of 40 to 110 miles from the centerline (USFWS 2009a). As such, wetlands within 40 miles of the centerline were assigned a value of 8 for Criterion 6, while those between 40 and 110 miles from the centerline were assigned a score of 2. These values are proportional to the numbers of confirmed sightings within each zone of the corridor. The distance of a wetland from the centerline was calculated from the edge of the wetland closest to the center line.

Table 3-7
Criterion 6: Within Corridor Location Suitability Score

Wetland Location within Corridor[1]	Score
Within 40 miles of centerline	8
40–110 miles of centerline	2

Note:
(1) USFWS 2009a.

3.4 Applying Habitat Suitability Scores

The model described above was applied to the wetlands at a reference site, Salt Plains NWR, to determine the habitat suitability scores that represent high quality habitat. The Watershed Institute, Inc. used the average score for wetlands at a different reference site, Quivira NWR, as their baseline score. Both Salt Plains NWR and Quivira NWR are designated critical habitat for the whooping crane. Salt Plains NWR is closer to the Project than Quivira NWR and was therefore selected as the reference site for the Project. The average score at Salt Plains NWR serves as the baseline score above which wetlands in the Project’s assessment area were considered high quality whooping crane stopover habitat.

The model described above was applied to the NWI wetlands at Salt Plains NWR with the following differences from the methods outlined in Sections 3.1 through 3.3:

- **Section 3.1:** The assessment area for the reference site was the UFSWS’s whooping crane critical habitat layer at Salt Plains NWR (USFWS 2014a).
- **Section 3.3, Criterion 5:** All wetlands at the reference site were considered part of a wetland mosaic (score of 3) except for single wetlands that were separated from the main body of wetlands by a road or a wooded area.

3.5 Comparing Confirmed Sighting Data

The habitat suitability scores of wetlands at the reference site, Salt Plains NWR, were compared against confirmed whooping crane sighting data maintained by the USFWS (2010c). The purpose of this exercise was to verify that the average score of potentially suitable wetlands at Salt Plains NWR served as an appropriate baseline score above which wetlands could be considered high quality whooping crane stopover habitat. To accomplish this, all confirmed whooping crane observations occurring within potentially suitable wetlands at Salt Plains NWR were identified. Observations recorded exclusively as flyovers were eliminated from the analysis. Each remaining whooping crane observation was assigned a score equaling that of the potentially suitable wetland in which the observation was recorded.

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4.0 Results and Conclusions

Of the 1,895 NWI wetlands within the Project's assessment area, 453 were eliminated due to the wetland's classification (e.g., wooded wetland, excavated wetland). Of the remaining wetlands, 1,020 wetlands were removed because of their proximity to human disturbances and 350 were eliminated because they had visibility obstructions (e.g., trees, topography) or appeared to be steep-sided ponds without suitable shallows. The remaining 72 wetlands within the Project's assessment area were potentially suitable wetlands and received habitat suitability scores. The habitat suitability scores of the 72 wetlands were between 5 and 18 with an average score of 10.5. The two wetlands in the assessment area with the highest score (18) were seasonally flooded riverine wetlands on the Cimarron River. The locations of the 72 potentially suitable wetlands within the assessment area are shown in Figure 4-1, "Potentially Suitable Habitat within the Whooping Crane Habitat Suitability Assessment Area." The habitat suitability scores for the 72 potentially suitable wetlands are provided in Appendix B and are graphically displayed in Figure 4-2, "Wetlands and Whooping Crane Sightings per Wetland Habitat Suitability Score."

The reference site, Salt Plains NWR, had 1,206 NWI wetlands within the whooping crane critical habitat at the refuge. Of these, 747 were eliminated based on the wetland's classification and 61 were eliminated because of their proximity to human disturbances. A further 133 wetlands were removed because of visibility obstructions, which were primarily trees and shrubs. The remaining 265 potentially suitable wetlands had habitat suitability scores between 14 and 27 with an average of 19.9 for the 6 criteria. Therefore, the threshold at which a wetland within 1 mile of the Project is considered high quality whooping crane habitat is 20. The suitable wetlands at Salt Plains NWR are shown in Figure 4-3, "Potentially Suitable Wetlands at Salt Plains National Wildlife Refuge," and are graphically displayed according to wetland suitability score in Figure 4-2, "Wetlands and Whooping Crane Sightings per Wetland Habitat Suitability Score."

A total of 137 confirmed whooping crane sightings have been recorded within the Salt Plains NWR critical habitat boundary through 2010. Of these sightings, 118 were recorded in potentially suitable wetlands; however, seven observations were removed from the analysis as they were observed in flight, and not directly associated with a particular wetland. The 111 confirmed whooping crane sightings occurred in potentially suitable wetlands with habitat suitability scores ranging from 20 to 26 with an average score of 24.1 (see Figure 4-2, "Wetlands and Whooping Crane Sightings per Wetland Habitat Suitability Score"). All of the confirmed whooping crane sightings occurred in wetlands with suitability scores equal to or higher than the threshold of 20, above which stopover habitats were determined to be high quality by the model. These results provide further credence to the concept that wetlands scoring less than 20 in the Project's assessment area are lower quality whooping crane stopover habitat.

None of the wetlands within the Project's assessment area had a habitat suitability score higher than 20 and, therefore, none of the wetlands within 1 mile of the Project are high quality whooping crane stopover habitat. Whooping cranes may still use wetlands within 1 mile of the Project, but, since these wetlands are low quality habitat, the likelihood of whooping cranes using these wetlands is low. The results of this habitat suitability model will be incorporated into the Project Biological Assessment currently in development by Clean Line.

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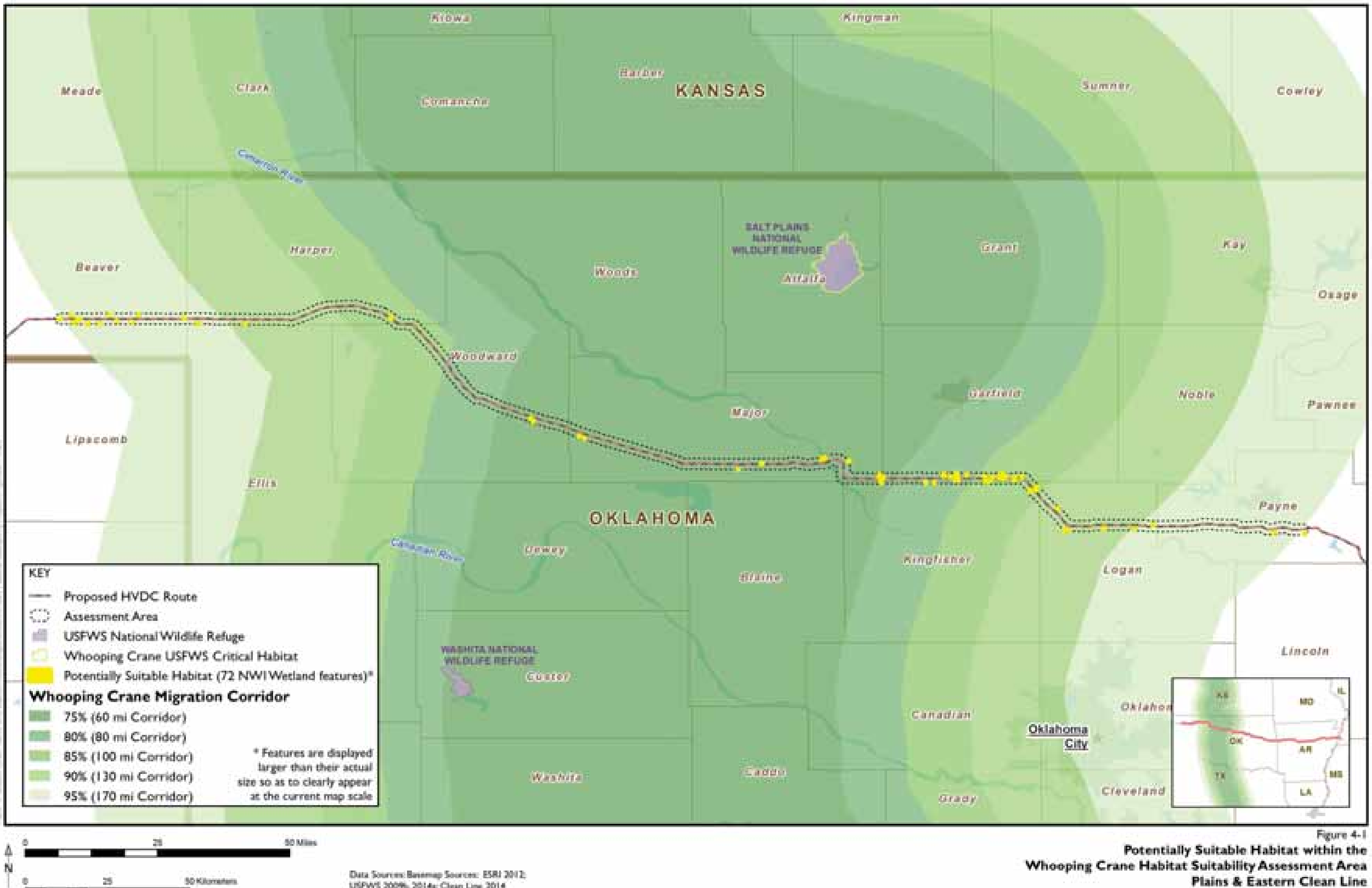


Figure 4-1
Potentially Suitable Habitat within the Whooping Crane Habitat Suitability Assessment Area
Plains & Eastern Clean Line
Oklahoma, Arkansas, Tennessee and Texas

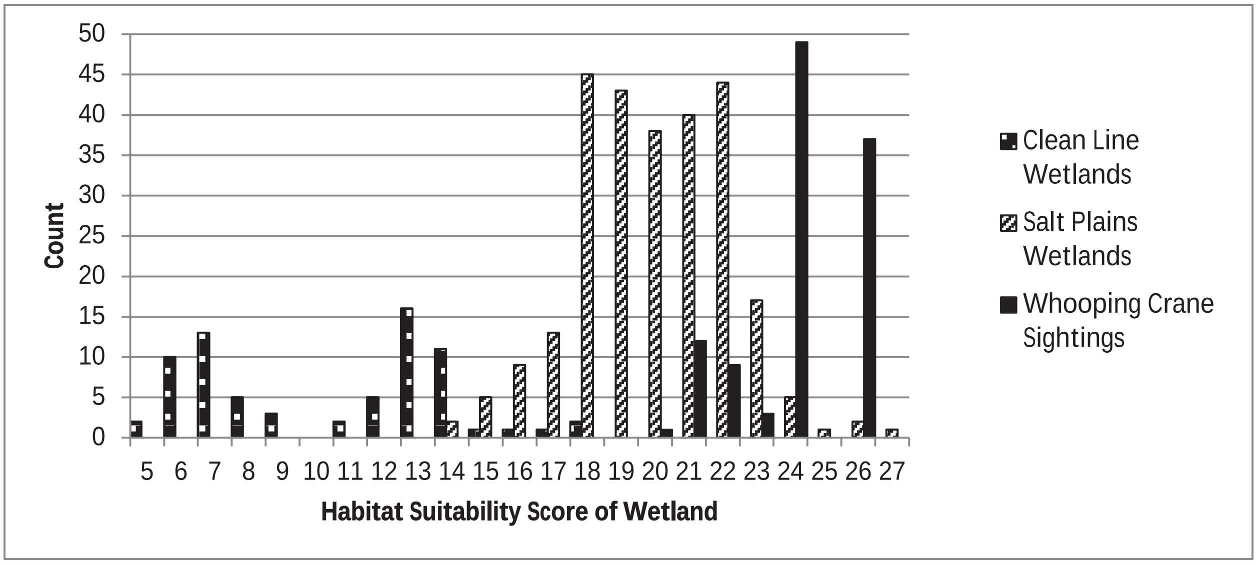
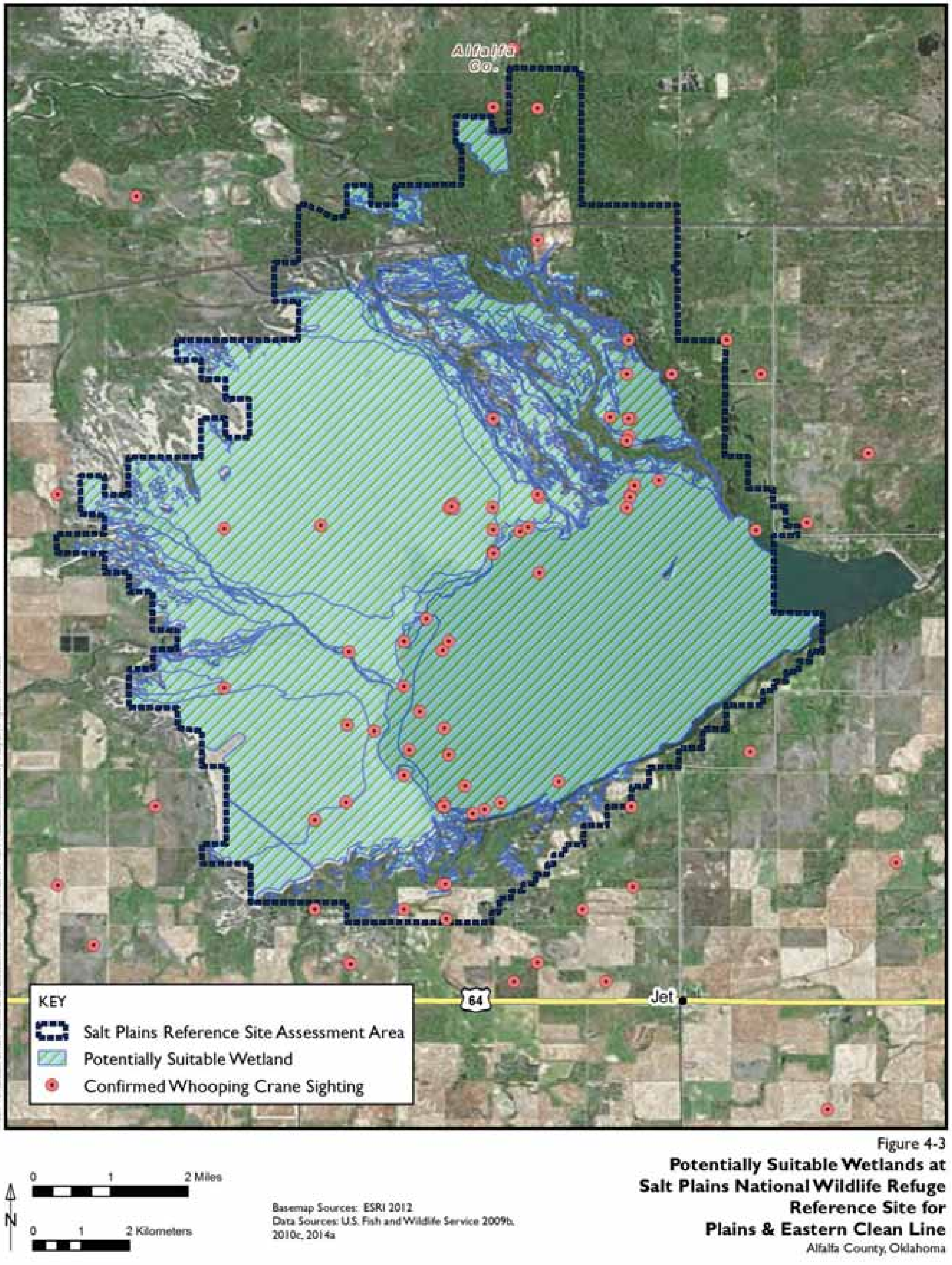


Figure 4-2: Wetlands and Whooping Crane Sightings per Wetland Habitat Suitability Score



Basemap Sources: ESRI 2012
Data Sources: U.S. Fish and Wildlife Service 2009b, 2010c, 2014a

Figure 4-3
Potentially Suitable Wetlands at Salt Plains National Wildlife Refuge Reference Site for Plains & Eastern Clean Line
Alfalfa County, Oklahoma

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Appendix A
Summary of Reviewed Literature

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Table A-1
Summary of Reviewed Literature

Reference	Study Species	Study Date(s)	Study Location	Whooping Crane Habitat Characteristics
Water Regime				
Armbruster 1990	Whooping crane, sandhill crane	Various[1]	Various[1]	▪ Utilize riverine, lacustrine, and palustrine wetlands for roosts ▪ Prefer lacustrine or palustrine wetlands with either semi-permanently flooded, intermittently exposed, permanently flooded, or artificially flooded water regimes
Austin and Richert 2005	Whooping crane	1977-1999	AWBP migration corridor	▪ Roost sites include palustrine (58.2%), riverine (33.3%), and lacustrine (7.8%) wetlands (out of 141 wetlands)
Faanes, Johnson, and Lingle 1992	Whooping crane	1983-1990	Platte River, central Nebraska	▪ Minimum river channel width of 53 m; prefers >150 m river channel width
Johns, Woodsworth, and Driver 1997	Whooping crane	1986-1990	Saskatchewan, Canada	▪ Family groups attracted to areas of high wetland density ▪ Prefers temporary and seasonal palustrine wetlands in the spring and semi-permanent and permanent lacustrine wetlands in the fall
Howe 1987	Whooping crane	1981-1984	AWBP migration corridor	▪ Intermittently exposed and semi-permanent wetlands used more than others ▪ Temporarily flooded wetlands used extensively in spring
Water Depth				
Armbruster 1990	Whooping crane, sandhill crane	Various[1]	Various[1]	▪ Mean water depth at wetland feeding sites was 20.2 cm
Faanes, Johnson, and Lingle 1992	Whooping crane	1983-1990	Platte River, central Nebraska	▪ Mean water depth at river roost sites was 20.2 cm
Johns, Woodsworth, and Driver 1997	Whooping crane	1986-1990	Saskatchewan, Canada	▪ Mean roost site water depth was 15.8 cm in spring and 12.9 cm in fall
Kuyt 1987	Whooping crane	1981-1982	AWBP migration corridor	▪ Roosts had bare pond bottoms and gentle slopes
Stahlecker 1997	Whooping crane	1997	Central Nebraska	▪ Human-made wetlands, especially <12.4 acres, did not have the same high habitat qualities as natural wetlands ▪ Some impoundment in Nebraska had suitable shallows

Table A-1
Summary of Reviewed Literature

Reference	Study Species	Study Date(s)	Study Location	Whooping Crane Habitat Characteristics
Visibility Obstruction				
Armbruster 1990	Whooping crane, sandhill crane	Various[1]	Various[1]	▪ Visual obstructions are features 1.4 m or taller (height of whooping crane eye level) ▪ Unobstructed views may provide whooping cranes with security (ability to see predators) ▪ Minimum width for a disturbance buffer should be 100 m
Austin and Richert 2005	Whooping crane	1977-1999	AWBP migration corridor	▪ Prefer roosts with 1 to <5% slope ▪ Less than 8% of palustrine roost sites were adjacent to woodland habitat
Kuyt 1987	Whooping crane	1981-1982	AWBP migration corridor	▪ Roost sites had good horizontal visibility, minimal shoreline vegetation, and gentle surrounding slopes
Johns, Woodsworth, and Driver 1997	Whooping crane	1986-1990	Saskatchewan, Canada	▪ Prefer gently sloping shore lines (average of 2.2 degrees) and a topographic slope of 4.5 degrees within 500 m of shoreline ▪ Prefer roosts with vegetation <0.3 m in height and away from trees (average of 237 m in spring, 303 m in fall)
Wetland Size				
Armbruster 1990	Whooping crane, sandhill crane	Various[1]	Various[1]	▪ Assumed optimum wetland size was 2.5 acres or greater
Austin and Richert 2005	Whooping crane	1977-1999	AWBP migration corridor	▪ Roosts were frequently at large wetlands, primarily due to sightings as public conservation areas such as Salt Plains NWR
Howe 1987	Whooping crane	1981-1984	AWBP migration corridor	▪ 50% of wetlands were <2.5 acres in size and 75% of wetlands were <7.4 acres
Johns, Woodsworth, and Driver 1997	Whooping crane	1986-1990	Saskatchewan, Canada	▪ Mean roost site wetland size was 89 acres in spring and 1,255 acres in fall
USFWS 2009a	Whooping crane, sandhill crane	Various[1]	Various[1]	▪ 75% of roost wetlands were <10 acres and 40% were <1.24 acres
Proximity to Disturbance				
Armbruster 1990	Whooping crane, sandhill crane	Various[1]	Various[1]	▪ Adapted disturbance distances developed for sandhill cranes to whooping cranes
Johns, Woodsworth, and Driver 1997	Whooping crane	1986-1990	Saskatchewan, Canada	▪ Prefer locations 635 m from roads, 876 m from buildings, 766 m from powerlines (averaged across spring and fall)
Kuyt 1987	Whooping crane	1981-1982	AWBP migration corridor	▪ Roosts were several hundred meters from farm buildings on a few occasions, but most were 1 km or more from disturbances

Table A-1
Summary of Reviewed Literature

Reference	Study Species	Study Date(s)	Study Location	Whooping Crane Habitat Characteristics
Proximity to Food				
Armbruster 1990	Whooping crane, sandhill crane	Various[1]	Various[1]	▪ 1.5 km from roost to foraging habitat was assumed to provide the optimum conditions
Austin and Richert 2005	Whooping crane	1977-1999	AWBP migration corridor	▪ Habitats adjacent to roost sites (within 1.6 km) were most frequently cropland and upland perennial cover ▪ No observed pattern in distance between roost and feeding sites
Howe 1987	Whooping crane	1981-1984	AWBP migration corridor	▪ 75% of roost wetlands were within 1 km of a suitable feeding site ▪ Cranes often walked from roosts to nearby feeding sites
Johns, Woodsworth, and Driver 1997	Whooping crane	1986-1990	Saskatchewan, Canada	▪ Crop fields (food) averaged 419 m from wetlands (roost) in spring and 992 m in fall ▪ Prefer roost sites <1 km harvested cereal crop fields (wheat and barley stubble)
Kuyt 1987	Whooping crane	1981-1982	AWBP migration corridor	▪ Prefer barley and wheat stubble fields with good horizontal visibility, <3 km from roosts

Note:
(1) Reference was a compilation of results of other studies; therefore, location and species varied.

Key:
AWBP = Aransas-Wood Buffalo Population of the whooping crane
cm = centimeter
km = kilometer
m = meter

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Appendix B
Project Assessment Area Potentially Suitable Wetland Results

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Table B-1
Project Assessment Area Wetland Whooping Crane Habitat Suitability Scores

Wetland Classification[1]	Wetland Type	Wetland Size (Acres)	Suitability Scores[2] Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Criterion 6	Overall Score
PEM1Ah	Freshwater Emergent Wetland	0.13	1	1	1	0	0	2	5
PUSAh	Other	0.32	1	1	1	0	0	2	5
PUSAh	Other	0.12	1	2	1	0	0	2	6
PUSAh	Freshwater Pond	0.13	1	2	1	0	0	2	6
PUSAh	Freshwater Pond	2.01	1	1	2	0	0	2	6
PUSAh	Other	0.18	1	2	1	0	0	2	6
PUSAh	Other	0.16	1	2	1	0	0	2	6
PUSAh	Other	0.20	1	2	1	0	0	2	6
PUSCh	Other	0.43	2	1	1	0	0	2	6
PUSAh	Other	0.19	1	2	1	0	0	2	6
PUSAh	Other	0.53	1	2	1	0	0	2	6
PUSCh	Other	0.15	2	1	1	0	0	2	6
PUSCh	Other	0.44	2	2	1	0	0	2	7
PUSCh	Other	0.28	2	2	1	0	0	2	7
PUSAh	Freshwater Pond	0.03	1	3	1	0	0	2	7
PUSAh	Other	0.23	1	3	1	0	0	2	7
PUSCh	Other	1.18	2	1	2	0	0	2	7
PUSCh	Other	0.73	2	2	1	0	0	2	7
PUSCh	Other	1.44	2	1	2	0	0	2	7
PUSAh	Other	1.90	1	2	2	0	0	2	7
PUSCh	Other	2.17	2	1	2	0	0	2	7
PUSCh	Other	0.68	2	2	1	0	0	2	7
PUSAh	Other	0.14	1	3	1	0	0	2	7
PUSCh	Other	0.45	2	2	1	0	0	2	7
PUSCh	Freshwater Pond	0.96	2	2	1	0	0	2	7
PEM1Ch	Freshwater Emergent Wetland	1.15	2	2	2	0	0	2	8
PUSCh	Other	1.84	2	2	2	0	0	2	8
PUBFh	Freshwater Pond	0.18	3	2	1	0	0	2	8
PUSCh	Freshwater Pond	0.07	2	3	1	0	0	2	8
PUSCh	Other	0.43	2	3	1	0	0	2	8
PUSA	Other	0.41	1	3	1	2	0	2	9
PUBFh	Freshwater Pond	0.44	3	3	1	0	0	2	9

Table B-1
Project Assessment Area Wetland Whooping Crane Habitat Suitability Scores

Wetland Classification[1]	Wetland Type	Wetland Size (Acres)	Suitability Scores[2] Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Criterion 6	Overall Score
PUSA	Other	0.25	1	3	1	2	0	2	9
PEM1C	Freshwater Emergent Wetland	8.30	2	1	4	2	0	2	11
PUSAh	Freshwater Pond	0.13	1	1	1	0	0	8	11
PUSCh	Freshwater Pond	0.15	2	1	1	0	0	8	12
PUSCh	Freshwater Pond	0.25	2	1	1	0	0	8	12
PEM1Ah	Freshwater Emergent Wetland	0.69	1	2	1	0	0	8	12
PUSCh	Freshwater Pond	0.11	2	1	1	0	0	8	12
PUSAh	Freshwater Pond	0.02	1	2	1	0	0	8	12
PUSCh	Freshwater Pond	0.67	2	2	1	0	0	8	13
PUSCh	Freshwater Pond	0.25	2	2	1	0	0	8	13
PUSCh	Freshwater Pond	0.39	2	2	1	0	0	8	13
PUSCh	Freshwater Pond	0.50	2	2	1	0	0	8	13
PUSCh	Freshwater Pond	0.91	2	2	1	0	0	8	13
PUSCh	Freshwater Pond	0.37	2	2	1	0	0	8	13
PEM1A	Freshwater Emergent Wetland	0.56	1	1	1	2	0	8	13
PEMf	Freshwater Emergent Wetland	0.41	1	1	1	2	0	8	13
PUSCh	Freshwater Pond	0.28	2	2	1	0	0	8	13
PEM1A	Freshwater Emergent Wetland	0.30	1	1	1	2	0	8	13
PUBFh	Freshwater Pond	0.93	3	1	1	0	0	8	13
PUSCh	Freshwater Pond	0.42	2	2	1	0	0	8	13
PEM1Ch	Freshwater Emergent Wetland	0.12	2	2	1	0	0	8	13
PUSCh	Freshwater Pond	0.50	2	2	1	0	0	8	13
PUSCh	Freshwater Pond	0.25	2	2	1	0	0	8	13
PUSCh	Freshwater Pond	0.24	2	2	1	0	0	8	13

Table B-1
Project Assessment Area Wetland Whooping Crane Habitat Suitability Scores

Wetland Classification[1]	Wetland Type	Wetland Size (Acres)	Suitability Scores[2]						
			Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Criterion 6	Overall Score
PEM1Ch	Freshwater Emergent Wetland	1.61	2	2	2	0	0	8	14
PUSCh	Freshwater Pond	1.47	2	2	2	0	0	8	14
PUSA	Freshwater Pond	0.27	1	2	1	2	0	8	14
PEM1C	Freshwater Emergent Wetland	0.02	2	1	1	2	0	8	14
PEM1C	Freshwater Emergent Wetland	0.41	2	1	1	2	0	8	14
PEM1C	Freshwater Emergent Wetland	0.87	2	1	1	2	0	8	14
PUSC	Freshwater Pond	0.57	2	1	1	2	0	8	14
PEM1C	Freshwater Emergent Wetland	0.80	2	1	1	2	0	8	14
PEMf	Freshwater Emergent Wetland	0.40	1	2	1	2	0	8	14
PEM1Ch	Freshwater Emergent Wetland	1.32	2	2	2	0	0	8	14
PUBFh	Freshwater Pond	0.54	3	2	1	0	0	8	14
PUBFh	Freshwater Pond	2.22	3	2	2	0	0	8	15
PUBF	Freshwater Pond	0.66	3	2	1	2	0	8	16
PUBHh	Freshwater Pond	1.63	5	2	2	0	0	8	17
R2USC	Riverine	4.22	2	3	3	2	0	8	18
R2USC	Riverine	4.23	2	3	3	2	0	8	18

Note:
(1) National Wetlands Inventory classifications based on Cowardin et al. 1979.
(2) The higher the score the more suitable the wetland is as whooping crane stopover habitat.

Wetland Classification Key:
P = Palustrine
R2 = Lower perennial riverine
EM = Emergent
EM1 = Persistent emergent
AQ = Aquatic bed
UB = Unconsolidated bottom
US = Unconsolidated shore
H = Permanently flooded
F = Semi permanently flooded
A = Temporarily flooded
C = Seasonally flooded
h = Diked/impounded
f = Farmed

Criterion Key:
Criterion 1 = Wetland Regime
Criterion 2 = Distance to Foraging Habitat
Criterion 3 = Wetland Size
Criterion 4 = Natural Wetland vs. Created Wetland
Criterion 5 = Wetland Mosaic
Criterion 6 = Wetland Location within Migration Corridor

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Addendum to the Final Biological Assessment (March 27, 2015)

for the

PLAINS & EASTERN
CLEAN LINE

July 2015

Pre-Decisional; Subject to Revision; Not for Public Distribution

Prepared for:

CLEAN LINE
ENERGY PARTNERS

Prepared by:

ecology and environment, inc.
Global Environmental Specialists

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Acronyms and Abbreviations

ABB	American burying beetle
APR	Applicant Proposed Route
BA	Biological Assessment
Clean Line	Clean Line Energy Partners LLC, Plains and Eastern Clean Line LLC, and Plains and Eastern Clean Line Oklahoma LLC
DOE	(United States) Department of Energy
EPM	Environmental Protection Measure
HVDC	high-voltage direct current
LEPC	lesser prairie-chicken
NLEB	northern long-eared bat
Project, the	Plains & Eastern Clean Line transmission project
ROW	right-of-way

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1.0 Introduction

Clean Line Energy Partners LLC, Plains and Eastern Clean Line LLC, and Plains and Eastern Clean Line Oklahoma LLC (Clean Line) present this report to the U.S. Fish and Wildlife Service as supplementary information to support the Final Biological Assessment (Final BA) for the Plains & Eastern Clean Line Project (the Project) submitted March 27, 2015.

Clean Line has proposed to the U.S. Department of Energy (DOE) several modifications to the Applicant Proposed Route (APR) for the high-voltage direct current (HVDC) transmission line route for the Project (see the Overview Maps provided in Appendix A). Since submitting the Final BA in March, Clean Line has continued technical evaluations of the 1,000-foot-wide APR corridor and the 200-foot-wide representative right-of-way (ROW) for the HVDC transmission line. Further, Clean Line has received input and suggestions from landowners regarding potential locations for the ROW in relation to specific parcels. Based on this input, Clean Line identified 22 potential variations to the APR that was described and analyzed in the Final BA. Each of these variations would modify a discrete portion of one of the links in the APR corridor evaluated in the Draft Environmental Impact Statement and also in the Final BA.

Clean Line has evaluated the technical feasibility of these variations and determined each is feasible. A summary of these 22 variations can be found in the route variations reports provided in Appendix B. Clean Line has updated the APR to incorporate each variation and has also included the updated APR in the Project Description (Revision 3.0) that was provided to DOE in June 2015 for consideration in the Final Environmental Impact Statement (see Appendix C). This addendum to the Final BA addresses any potential differences in the Action Area, potential direct and indirect impacts, and effects determinations associated with the updated APR. This review confirms that the adjustments to the APR to reflect the 22 route variations will not change the effects determinations made in the Final BA.

2.0 Modification of the Proposed Action Area

As discussed in Section 3.0 of the Final BA, the Action Area for the Project considered not simply the area of potential direct and indirect disturbance, but also a wider geographic area depending on the nature of the Project's impacts in relation to each species. Therefore, potential impacts on each species were analyzed based on species-specific Action Areas. At a minimum, the Action Area for each species was determined to be the Project disturbance footprint, which is defined as the edge or limit of ground disturbance for the Project. The Project disturbance footprint for the HVDC line consisted of the 200-foot-wide ROW of the APR. From that initial starting point, species-specific Action Areas have been developed to ensure that the potential direct and indirect effects of the Project upon the specific species and any designated critical habitat are analyzed consistent with the requirements of ESA, section 7(a)(2).

The APR has been updated to reflect these 22 variations, as well as any micro siting adjustments that occurred along the approximately 720-mile route (see the Overview Maps in Appendix A, Route Variation Reports in Appendix B, and Figure 2.5 of the Project Description in Appendix C). The updated APR inherently results in changes to the Action Area for some species. Clean Line reviewed the updated APR to determine if any of the variations occur within the range of species identified in the Final BA.

3.0 Species Potentially Affected by the Modified APR

Based on a review of the available data for the 30 species evaluated in the BA, Clean Line determined that 12 species do not occur within the Action Area associated with the 22 variations, these include: *geocarpon, Curtis pearlymussel, Neosho mucket, pink mucket, spectaclecase, Arkansas darter, pallid sturgeon, Ozark hellbender, Florida panther, fanshell, yellowcheek darter,* and *Ozark cavefish*. Please see the species-specific discussion in the Final BA supporting the effects determinations for each of these species.

Clean Line identified 18 species that are known to or potentially occur in the Action Area for the 22 variations to the APR. Clean Line reviewed each species for potential presence in the updated Action Area to determine whether potential impacts on the 18 species differ from those disclosed in the BA. Clean Line determined that for 8 of those species the Final BA provides sufficient information to support the effects determination on the updated APR. These include the *fat pocketbook, rabbitsfoot, scaleshell mussel, snuffbox, speckled pocketbook, interior least tern, piping plover,* and *red knot (*rufa subspecies).

Clean Line identified 10 species that are known to or potentially occur in the Action Area and for which additional information is necessary to support consultation in relation to the updated APR. For each of those species, supplementary information to support the Final BA is provided below, including additional desktop/field analysis, potential direct and indirect impacts, and effects determinations.

4.0 Species Evaluations and Supplementary Information

4.1 Pondberry

Clean Line has proposed one variation to the APR in Jackson County, Arkansas, a county in which Pondberry is known to occur. A description of the variation in Jackson County (Region 6, Link 2, Variation 1) can be found in Route Variation Analysis Data Request 3, Response 1 provided in Appendix B.

Additional Desktop/Field Analysis

Preferred pondberry habitat is defined as sand pond habitats and low ridges in hardwood bottomland forests. Palustrine, forested, deciduous wetlands could provide potential habitat for pondberry. A desktop review of the variation revealed two National Wetland Inventory features (totaling 3.77 acres) defined as deciduous, forested wetlands that are crossed by the variation. Therefore, the variation crosses one less wetland than the original APR, but approximately 2 more acres of potential wetland habitat.

Direct and Indirect Impacts

Based on a review of the variation in relation to potential pondberry habitat, there are no significant changes to the direct and indirect impacts discussed in the Final BA. The new information regarding the reduction of forested, wetland crossings and increased wetland acreage does not change the effects of the Project on the pondberry in a manner or to an extent not analyzed in the Final BA.

Effects Determination

The incorporation of the variation into the APR does not result in significant changes to the potential for, or magnitude of, direct and indirect impacts, or reveal effects of the Project that may affect the species in a manner or to an extent not analyzed in the Final BA. As identified in the BA, the Project has implemented several Environmental Protection Measures (EPMs) and species-specific protection measures that will avoid and/or minimize impacts to the pondberry if it is discovered during preconstruction or construction activities. Based on the proposed Project design as well as the implementation of the EPMs and species-specific measures proposed in the BA, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project "may effect, but is not likely to adversely affect" the pondberry.

4.2 American Burying Beetle

A review of the 2015 range data (geographic information system data) for the American burying beetle (ABB) revealed that the westernmost range of the ABB in Oklahoma was expanded to include portions of eastern Payne County. Clean Line identified eight variations to the APR that are located within the range of the ABB which were not included in the Final BA. The following table identifies each of the eight variations that occur in the ABB range and the corresponding Route Variation Analysis that describes each.

County	Variation ID	Route Variation Analysis
Lincoln County, OK	Region 3, Link 4, Variation 1	Response to Data Request 2
Creek County, OK	Region 3, Link 4, Variation 2	Response to Data Request 1, Part 1
Muskogee County, OK	Region 3, Link 5, Variation 2	Supplemental Information to Data Request 2, Response 1
Sequoyah County, OK	Region 4, Link 3, Variation 1	Response to Data Request 2
Crawford County, AR	Region 4, Link 3, Variation 3	Response 3 to Data Request 3
Crawford County, AR	Region 4, Link 6, Variation 1	Response to Data Request 2
Crawford County, AR	Region 4, Link 6, Variation 3	Supplemental Information #1 to Data Request 1
Crawford County, AR	Region 4, Link 6, Variation 2	Response to Data Request 2

Additional Desktop/Field Analysis

A desktop analysis of the updated APR was conducted to determine potential habitat suitability. The desktop analysis followed the methodology and description of results included as Appendix C of the Final BA ("Desktop Assessment of Habitat Suitability for the American Burying Beetle [*Nicrophorus americanus*] for Clean Line Energy Partners, LLC"). The Project traverses 222 miles within ABB range in Oklahoma and Arkansas. The model revealed that 52 percent of the 200-foot-wide study corridor and 51.4 percent of the 1,200-foot-wide study corridor was potentially favorable habitat. This included approximately 2,796.5 acres of potentially favorable habitat within the 200-foot ROW. The slight increase in potential suitable habitat identified by the desktop assessment was a result of the westward expansion of the ABB range.

Direct and Indirect Impacts

Based on a review of the variations and the updates to the desktop analysis, there are no significant changes to the direct and indirect impacts discussed in the Final BA. The new information does not change the effects of the Project on the species or critical habitat in a manner or to an extent not analyzed in the Final BA.

Effects Determination

The incorporation of the eight variations (within the ABB Range) into the APR does not result in significant changes to the potential for, or magnitude of, direct and indirect impacts or reveal effects of the Project that may affect the ABB in a manner or to an extent not analyzed in the Final BA. As identified in the BA, the Project includes several actions in favorable ABB habitat that is assumed to be occupied; therefore, the Project "may affect, and is likely to adversely affect" the ABB.

4.3 Arkansas River Shiner

Clean Line identified two variations to the APR that occur within the range of the Arkansas River Shiner in Woodward and Major Counties, Oklahoma. A description of the variation that occurs in Woodward County, Oklahoma (Region 2, Link 2, Variation 1) can be found in Route Variation Analysis Request 2, Response 3 provided in Appendix B. A description of the variation that occurs in Major County, Oklahoma (Region 2, Link 2, Variation 2) can be found in Route Variation Analysis Supplemental Information #2 to Data Request 2, Response 1, also provided in Appendix B.

Additional Desktop/Field Analysis

A desktop review of the variations revealed four additional tributaries would be crossed by the updated APR, resulting in a total of between 79 to 89 perennial or intermittent tributary crossings that potentially support ARS in Harper, Woodward, Major, and Garfield Counties, Oklahoma.

Direct and Indirect Impacts

Based on a review of the variations in relation to potential Arkansas River Shiner habitat, there are no significant changes to the direct and indirect impacts discussed in the Final BA. The new information regarding the additional tributary crossings does not change the effects of the Project on the Arkansas River Shiner in a manner or to an extent not analyzed in the original BA.

Effects Determination

The incorporation of the variation into the APR does not result in significant changes to the potential for, or magnitude of, direct and indirect impacts or reveal effects of the Project that may affect the Arkansas River shiner or critical habitat in a manner or to an extent not analyzed in the Final BA. As identified in the BA, the Project has implemented several EPMs and species-specific protection measures that will avoid and/or minimize impacts to Arkansas River shiner. Based on the proposed Project design as well as the implementation of the EPMs and species-specific measures proposed in the Final BA, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant and discountable and would not result in take. Therefore, the Project "may effect, but is not likely to adversely affect" the Arkansas River shiner.

4.4 Gray Bat

Clean Line identified 13 variations to the original APR that occur within the Action Area for the gray bat. The following table identifies each of the 13 variations that occur in the gray bat range and the corresponding Route Variation Analysis that describes each.

County	Variation ID	Route Variation Analysis
Muskogee County, OK	Region 3, Link 5, Variation 2	Supplemental Information to Data Request 2, Response 1
Sequoyah County, OK	Region 4, Link 3, Variation 1	Response to Data Request 2
Crawford County, AR	Region 4, Link 3, Variation 3	Response 3 to Data Request 3
Crawford County, AR	Region 4, Link 6, Variation 1	Response to Data Request 2
Crawford County, AR	Region 4, Link 6, Variation 3	Supplemental Information #1 to Data Request 1
Crawford County, AR	Region 4, Link 6, Variation 2	Response to Data Request 2
Pope County, AR	Region 4, Link 9, Variation 1	Response to Data Request 2
Pope County, AR	Region 5, Link 1, Variation 2	Data Request 1, Response 7
Pope County, AR	Region 5, Link 2, Variation 2	Data Request 1, Response 3
Pope County, AR	Region 5, Links 2 & 3, Variation 1	Response to Data Request 2
Van Buren County, AR	Region 5, Links 3 & 4, Variation 2	Supplemental Information #1 to Data Request 1
White County, AR	Region 5, Link 7, Variation 1	Response to Data Request 2
Jackson County, AR	Region 6, Link 2, Variation 1	Data Request 3, Response 1

Additional Desktop/Field Analysis

Clean Line reevaluated the availability of potential foraging habitat for the gray bat in its Action Area. The original analysis was presented in Section 5.21.4 of the Final BA, "Presence in the Action Area Based on Existing Data." The updated analysis revealed decreases in perennial streams (8 percent) and perennial waterbodies (16 percent), and an increase in wetlands (11 percent) within the Action Area compared to that identified in the Final BA (see Revised Table 5.21-1, "Potential Gray Bat Foraging Habitat Available in the Action Area").

Revised Table 5.21-1
Potential Gray Bat Foraging Habitat Available in the Action Area

Location	Perennial Streams (miles)	Perennial Waterbodies (acres)	Wetlands (acres)
Arkansas			
Cleburne	31.7	135.6	106.3
Crawford	63.3	2,404.4	1,716.8
Franklin	45.3	1,162.6	162.0
Jackson	63.4	413.7	6,739.5
Johnson	50.8	563.5	21.6
Pope	46.1	239.6	33.2
Van Buren	22.6	126.7	-
White	69.2	206.4	1,322.9

Revised Table 5.21-1 Potential Gray Bat Foraging Habitat Available in the Action Area			
Location	**Perennial Streams (miles)**	**Perennial Waterbodies (acres)**	**Wetlands (acres)**
Oklahoma			
Muskogee	258.2	4,102.3	4,200.2
Sequoyah	55.0	421.8	1,430.5
Total	705.5	9,776.6	15,733.0

Sources: ESRI 2010; USFWS 2012b; USGS 2012.

Direct and Indirect Impacts

Based on a review of the variations and the updates to the desktop analysis, there are no significant changes to the direct and indirect impacts discussed in the Final BA. The new information does not change the effects of the Project on the gray bat in a manner or to an extent not analyzed in the original BA.

Effects Determination

The incorporation of the 13 variations into the APR does not result in significant changes to the potential for, or magnitude of, direct and indirect impacts or reveal effects of the Project that may affect the gray bat in a manner or to an extent not analyzed in the Final BA. As identified in the BA, Clean Line may impact potentially suitable caves that are assumed occupied until pre-construction surveys are conducted. As such, potential unavoidable impacts on gray bats through disturbances of potential caves are not discountable or insignificant; therefore, the Project "may affect, and is likely to adversely affect" the gray bat.

4.5 Indiana Bat

Clean Line identified 12 variations to the original APR that occur within the Action Area for the Indiana bat. The following table identifies each of the 12 variations that occur in the Indiana bat range and the corresponding Route Variation Analysis that describes each.

County	Variation ID	Route Variation Analysis
Sequoyah County, OK	Region 4, Link 3, Variation 1	Response to Data Request 2
Crawford County, AR	Region 4, Link 3, Variation 3	Response 3 to Data Request 3
Crawford County, AR	Region 4, Link 6, Variation 1	Response to Data Request 2
Crawford County, AR	Region 4, Link 6, Variation 3	Supplemental Information #1 to Data Request 1
Crawford County, AR	Region 4, Link 6, Variation 2	Response to Data Request 2
Pope County, AR	Region 4, Link 9, Variation 1	Response to Data Request 2
Pope County, AR	Region 5, Link 1, Variation 2	Data Request 1, Response 7
Pope County, AR	Region 5, Link 2, Variation 2	Data Request 1, Response 3
Pope County, AR	Region 5, Links 2 & 3, Variation 1	Response to Data Request 2

County	Variation ID	Route Variation Analysis
Van Buren County, AR	Region 5, Links 3 & 4, Variation 2	Supplemental Information #1 to Data Request 1
Jackson County, AR	Region 6, Link 2, Variation 1	Data Request 3, Response 1
Shelby County, TN	Region 7, Link 5, Variation 1	Response to Data Request 2

Additional Desktop/Field Analysis

Clean Line reevaluated the availability of potential foraging habitat for the Indiana bat in its Action Area. The original analysis was presented in the Final BA in Section 5.22.4, "Presence in the Action Area Based on Existing Data." The updated analysis revealed decreases in perennial streams (2 percent) and forest habitats (<1 percent), and an increase in perennial waterbodies (13 percent%) within the Action Area compared to that identified in the Final BA (see Revised Table 5.22-3, "Potential Indiana Bat Foraging Habitat Available in the Action Area").

Revised Table 5.22-3
Potential Indiana Bat Foraging Habitat Available in the Action Area

Location	Perennial Streams (miles)	Perennial Waterbodies (acres)	Deciduous Forest (acres)	Evergreen Forest (acres)	Mixed Forest (acres)	All Forests (acres)
Arkansas						
Cleburne	31.7	361.6	15,022.2	6,103.0	4,787.7	25,912.9
Crawford	63.3	2,751.2	16,775.9	5,637.0	2,886.1	25,299.1
Franklin	45.3	1,355.4	6,579.0	14,328.0	4,009.8	24,916.7
Jackson	63.4	454.5	9,855.6.7	401.1	3,723.1	13,979.8
Johnson	50.8	732.9	19,956.1	23,173.5	5,438.9	48,568.5
Pope	46.1	454.7	23,426.5	26,919.4	5,658.2	56,004.2
Van Buren	22.6	262.9	7,979.0	2,609.4	1,717.4	12,305.8
Oklahoma						
Sequoyah	55.0	738.4	47,523.1	1,356.7	1,697.3	50,577.2
Tennessee						
Shelby	11.2	156.6	1,116.2	240.2	41.6	1,398.1
Tipton	21.1	372.3	6,422.7	168.6	72.1	6,663.3
Total	410.5	7,640.7	154,656.4	80,936.9	30,032.3	265,625.7

Sources: USGS 2012; Jin et al. 2013.

Direct and Indirect Impacts

Based on a review of the variations and the updates to the desktop analysis, there are no significant changes to the direct and indirect impacts discussed in the Final BA. The new information does not change the effects of the Project on the Indiana bat in a manner or to an extent not analyzed in the Final BA.

Effects Determination

The incorporation of the 12 variations into the APR does not result in significant changes to the potential for, or magnitude of, direct and indirect impacts or reveal effects of the Project that may affect the Indiana bat in a manner or to an extent not analyzed in the Final BA. As identified in the Final BA, Clean Line will not clear trees during the breeding season and will minimize construction within 300 feet of occupied caves. However, project activities may impact potential roost trees and suitable caves used by the species. As such, potential unavoidable impacts on Indiana bats through removal of potential roost trees in occupied habitat and disturbances of potential caves are not discountable or insignificant; therefore, the Project "may affect, and is likely to adversely affect" the Indiana bat.

4.6 Northern Long-eared Bat

Clean Line identified 16 variations to the original APR that occur within the Action Area for the northern long-eared bat (NLEB). The following table identifies each of the 16 variations that occur in the NLEB range and the corresponding Route Variation Analysis that describes each.

County	Variation ID	Route Variation Analysis
Muskogee County, OK	Region 3, Link 5, Variation 2	Supplemental Information to Data Request 2, Response 1
Sequoyah County, OK	Region 4, Link 3, Variation 1	Response to Data Request 2
Crawford County, AR	Region 4, Link 3, Variation 3	Response 3 to Data Request 3
Crawford County, AR	Region 4, Link 6, Variation 1	Response to Data Request 2
Crawford County, AR	Region 4, Link 6, Variation 3	Supplemental Information #1 to Data Request 1
Crawford County, AR	Region 4, Link 6, Variation 2	Response to Data Request 2
Pope County, AR	Region 4, Link 9, Variation 1	Response to Data Request 2
Pope County, AR	Region 5, Link 1, Variation 2	Data Request 1, Response 7
Pope County, AR	Region 5, Link 2, Variation 2	Data Request 1, Response 3
Pope County, AR	Region 5, Links 2 & 3, Variation 1	Response to Data Request 2
Van Buren County, AR	Region 5, Links 3 & 4, Variation 2	Supplemental Information #1 to Data Request 1
White County, AR	Region 5, Link 7, Variation 1	Response to Data Request 2
Jackson County, AR	Region 6, Link 2, Variation 1	Data Request 3, Response 1
Mississippi County, AR	Region 7, Link 1, Variation 1	Response to Data Request 2
Mississippi County, AR	Region 7, Link 1, Variation 2	Response to Data Request 2
Shelby County, TN	Region 7, Link 5, Variation 1	Response to Data Request 2

Additional Desktop/Field Analysis

Clean Line reevaluated the availability of potential foraging habitat for the NLEB in its Action Area. The original analysis was presented in the Final BA in Section 5.23.4, "Presence in the Action Area Based on Existing Data." The updated analysis revealed increases in perennial streams (3 percent) and forest habitats (2 percent) within the Action Area compared to that identified in the Final BA (see Revised Table 5.23-1, "Potential Northern Long-eared Bat Foraging Habitat Available in the Action Area").

Revised Table 5.23-1
Potential Northern Long-eared Bat Foraging Habitat Available in the Action Area

Location	Perennial Streams (miles)	Deciduous Forest (acres)	Evergreen Forest (acres)	Mixed Forest (acres)	All Forests (acres)
Arkansas					
Cleburne	57.2	28,492.6	10,323.6	8,634.0	47,450.1
Conway	21.5	38,846.8	34,730.6	6,709.5	80,286.9
Crawford	127.2	31,850.5	11,326.3	5,598.2	48,775.0
Crittenden	0.6	58.1	2.2	12.6	582.2
Cross	28.6	10,847.1	69.6	1,653.8	12,570.5
Faulkner	28.7	18,532.0	4,922.7	2,738.7	26,193.4
Franklin	63.8	21,554.9	30,882.6	9,703.0	62,140.5
Independence	1.9	336.2	31.1	185.0	582.2
Jackson	110.9	20,398.4	772.8	5,267.2	26,438.3
Johnson	86.6	49,438.9	42,384.6	9,419.7	101,243.2
Mississippi	3.3	118.1	0	16.8	134.9
Poinsett	26.5	4,979.5	122.1	406.4	5,508.1
Pope	78.2	46,118.1	51,990.4	9,704.0	107,812.6
Sebastian	1.5	1,757.0	1,147.3	473.0	3,377.3
Van Buren	32.3	14,402.5	5,398.9	3,262.5	23,063.9
White	136.8	52,312.7	12,498.6	22,633.5	87,444.9
Woodruff	13.9	105.1	270.0	1.7	376.8
Oklahoma					
Cherokee	-	132.6	0	0	132.6
McIntosh	-	2,729.8	0	0	2,729.8
Muskogee	412.9	57,331.0	208.0	191.7	57,730.7
Okmulgee	375.5	52,194.9	9.4	0	52,204.3
Sequoyah	123.6	97,511.2	1,964.4	2,698.2	102,173.8
Wagoner	-	211.5	0	0	211.5
Tennessee					
Shelby	36.7	4,280.0	723.5	125.4	5,128.8
Tipton	39.6	13,078.9	332.4	148.3	13,559.7
Total	1,808.1	567,618.6	210,141.2	89,583.1	867,342.9

Sources: USGS 2012; Jin et al. 2013.

Direct and Indirect Impacts

Based on a review of the variations and the updates to the desktop analysis, there are no significant changes to the direct and indirect impacts discussed in the Final BA. The new information does not change the effects of the Project on the NLEB in a manner or to an extent not analyzed in the Final BA.

Effects Determination

The incorporation of the 16 variations into the APR does not result in significant changes to the potential for, or magnitude of, direct and indirect impacts or reveal effects of the Project that may affect the NLEB in a manner or to an extent not analyzed in the Final BA. As identified in the Final BA, Clean Line will not clear occupied roost trees during the breeding season and will minimize construction within 300 feet of occupied caves. However, Clean Line may impact potential roost trees and suitable caves used by the species. As such, potential unavoidable impacts on NLEBs through removal of potential roost trees in occupied habitat and disturbances of potential caves are not discountable or insignificant; therefore, the Project "may affect, and is likely to adversely affect" the NLEB.

4.7 Ozark Big-eared Bat

Clean Line identified nine variations to the original APR that occur within the Action Area for the Ozark big-eared bat. The following table identifies each of the nine variations that occur in the Ozark big-eared bat range and the corresponding Route Variation Analysis that describes each.

County	Variation ID	Route Variation Analysis
Sequoyah County, OK	Region 4, Link 3, Variation 1	Response to Data Request 2
Crawford County, AR	Region 4, Link 3, Variation 3	Response 3 to Data Request 3
Crawford County, AR	Region 4, Link 6, Variation 1	Response to Data Request 2
Crawford County, AR	Region 4, Link 6, Variation 3	Supplemental Information #1 to Data Request 1
Crawford County, AR	Region 4, Link 6, Variation 2	Response to Data Request 2
Pope County, AR	Region 4, Link 9, Variation 1	Response to Data Request 2
Pope County, AR	Region 5, Link 1, Variation 2	Data Request 1, Response 7
Pope County, AR	Region 5, Link 2, Variation 2	Data Request 1, Response 3
Pope County, AR	Region 5, Links 2 & 3, Variation 1	Response to Data Request 2

Additional Desktop/Field Analysis

Clean Line reevaluated the availability of potential foraging habitat for the Ozark big-eared bat in its Action Area. The original analysis was presented in Section 5.24.4 of the Final BA, "Presence in the Action Area Based on Existing Data." The updated analysis showed a slight increase in each forest type and a total forest habitat increase of less than 0.2 percent within the Action Area compared to that identified in the BA (see Revised Table 5.24-1, "Potential Ozark Big-eared Bat Foraging Habitat Available in the Action Area"). Additionally, the variation in western Crawford County (Region 4, Link 3, Variation 3) would avoid crossing two known Ozark big-eared bat winter hibernacula by approximately 3,659 feet and 4,233 feet, respectively. Previously, the project disturbance footprint associated with the APR analyzed in the Final BA crossed one of the hibernacula.

Revised Table 5.24-1
Potential Ozark Big-eared Bat Foraging Habitat Available in the Action Area

Location	Deciduous Forest (Acres)	Evergreen Forest (Acres)	Mixed Forest (Acres)	All Forests (Acres)
Arkansas				
Crawford	29,039.0	10,115.3	5,116.8	44,271.1
Franklin	17,638.3	27,010.2	8,377.1	53,025.6
Johnson	42,740.8	39,616.8	8,847.4	91,205.0
Pope	41,080.9	46,453.4	8,864.7	96,399.1
Oklahoma				
Sequoyah	88,790.1	1,876.5	2,564.5	93,231.1
Total	219,289.1	125,072.2	33,770.5	378,131.8

Source: Jin et al. 2013.

Direct and Indirect Impacts

Based on a review of the variations and the updates to the desktop analysis, there are no significant changes to the direct and indirect impacts discussed in the Final BA. Although the updated APR no longer crosses a known Ozark big-eared winter hibernacula, other undocumented roost features could be located in the vicinity of the APR; therefore, the new information does not change the effects of the Project on the Ozark big-eared bat in a manner or to an extent not analyzed in the original BA.

Effects Determination

The incorporation of the nine variations into the APR does not result in significant changes to the potential for, or magnitude of, direct and indirect impacts on Ozark big-eared bats discussed in the Final BA. As identified in the Final BA, Clean Line may impact potentially suitable caves that are assumed occupied until pre-construction surveys are conducted. As such, potential unavoidable impacts on Ozark big-eared bats through disturbances to potential caves are not discountable or insignificant; therefore, the Project "may affect, and is likely to adversely affect" the Ozark big-eared bat.

4.8 Lesser Prairie-Chicken

The updated APR includes only a single variation located in Woodward County, Oklahoma, that occurs within the Action Area for the lesser prairie-chicken (LEPC). A description of the variation in Woodward County, Oklahoma (Region 2, Link 1, Variation 1) can be found in Route Variation Analysis Data Request 1, Response 3, provided in Appendix B.

Additional Desktop/Field Analysis

Clean Line reviewed the variation in relation to the Action Area and conducted a habitat assessment of the land cover that occurs within the revised Action Area. The desktop analysis followed the methodology and description of results included as Appendix F of the Final BA ("Delineation of Potential Habitat for the Lesser Prairie-chicken along the Plains & Eastern Clean Line Transmission Line Project and its Associated Alternating Current Collection System Routes"). The results of the updated habitat assessment are provided below in the updated Table 5.26-3, "Summary of Land Cover in the Action Area" and Table 5.26-5, "Summary of Land Cover in Action Area."

Revised Table 5.26-3
Summary of Land Cover in the Action Area

Land Cover	Total in Action Area (acres)	Total in EOR in Action Area (acres)
Agricultural	17,599.0	8,164.9
Cropland	16,992.8	8,321.5
Invaded Grassland	2,207.2	1,054.2
Non-Habitat Grassland	5,360.3	1,679.9
Good Quality LEPC Habitat	4,391.4	1,971.5
Low Quality LEPC Habitat	15,512.2	8,732.7
Short Herbaceous	2,793.3	1,189.5
Non-Herbaceous	8,229.4	3,794.8

Source: SWCA 2014.

Revised Table 5.26-5
Summary of Land Cover in Action Area

Land Cover	Total in Action Area (acres)	Total in EOR in Action Area (acres)	Total Not Subjected to Pre-existing Impact (acres)	Total in EOR Not Subjected to Pre-existing Impact (acres)
Agricultural	17,599.0	8,164.9	5,464.1	1,983.7
Cropland	16,992.8	8,321.5	4,620.9	1,656.2
Invaded Grassland	2,207.2	1,054.2	695.1	647.6
Non-Habitat Grassland	5,360.3	1,679.9	1,266.6	151.6
Good Quality LEPC Habitat	4,391.4	1,971.5	2,006.1	411.2
Low Quality LEPC Habitat	15,512.2	8,732.7	5,351.0	2,125.9
Short Herbaceous	2,793.3	1,189.5	896.5	223.2
Non-Herbaceous	8,229.4	3,794.8	1,563.1	1,097.3

Direct and Indirect Impacts

The updated habitat assessment reports an additional 37 acres of low quality habitat within the Action Area associated with the updated APR; however, there are no significant changes to the direct and indirect impacts discussed in the Final BA. The new information does not change the effects of the Project on the LEPC in a manner or to an extent not analyzed in the original BA.

Effects Determination

As identified in the Final BA, the construction, operation, and maintenance of the transmission line within the 44-mile segment where LEPC are presumed to be present may result in avoidance of nesting and brood-rearing habitat that might be used in non-breeding seasons. This could result in decreased productivity, decreased fitness, and increased mortality rates as a result of increased competition for food resources. For these reasons, the Project "may affect, likely to adversely affect" the LEPC. The incorporation of the variation into the APR does not result in significant changes to the potential for, or magnitude of direct and indirect impacts discussed in the Final BA or reveal effects of the Project that may affect the LEPC in a manner or to an extent not analyzed in the Final BA.

4.9 Sprague's Pipit

Clean Line identified nine variations to the original APR that occur within the Action Area for the Sprague's pipit. The following table identifies each of the eight variations that occur within the Sprague's pipit migration and winter range in Oklahoma and the corresponding Route Variation Analysis that describes each.

County	Variation ID	Route Variation Analysis
Woodward County, OK	Region 2, Link 1, Variation 1	Data Request 2, Response 3
Major County, OK	Region 2, Link 2, Variation 2	Supplemental Information #2 to Data Request 2, Response 1
Payne County, OK	Region 3, Link 1, Variation 2	Response to Data Request 1, Part 2
Payne County, OK	Region 3 Links 1 and 2, Variation 1	Response to Data Request 2
Lincoln County, OK	Region 3, Link 4, Variation 1	Response to Data Request 2
Creek County, OK	Region 3, Link 4, Variation 2	Response to Data Request 1, Part 1
Muskogee County, OK	Region 3, Link 5, Variation 2	Supplemental Information to Data Request 2, Response 1
Sequoyah County, OK	Region 4, Link 3, Variation 1	Response to Data Request 2

Additional Desktop/Field Analysis

A desktop habitat assessment of the revised APR for the HVDC route was conducted to identify potential Sprague's pipit migration and winter habitat within the Action Area. The analysis revealed slightly more grassland habitat but less pasture habitat occurs within the Action Area than that identified in the Final BA (see Revised Table 5.29-1, "Grasslands and Pastures Potentially Impacted by Project Features – Proposed Route").

Revised Table 5.29-1
Grasslands and Pastures Potentially Impacted by Project Features – Proposed Route

County	Grassland (acres)	Pasture (acres)	ROW Acreage Total
Beaver	685.3	0	685.3
Creek	158.0	84.3	242.3
Garfield	144.3	0	144.3
Harper	611.3	0	611.3

Revised Table 5.29-1
Grasslands and Pastures Potentially Impacted by Project Features – Proposed Route

County	Grassland (acres)	Pasture (acres)	ROW Acreage Total
Kingfisher	10.3	0	10.3
Lincoln	125.6	8.9	134.5
Logan	274.8	0	274.8
Major	519.8	0	519.8
Muskogee	188.6	491.4	680.0
Okmulgee	166.3	325.0	491.3
Payne	389.6	43.5	433.2
Sequoyah	50.0	488.9	538.9
Texas	438.2	0	438.2
Woodward	622.5	0	622.5
Grand Total	**4384.5**	**1442.0**	**5826.5**

Note: Includes a 200-foot buffer (Jin et al. 2013). Includes areas that lie within the Sprague's pipit migration corridor, as defined by Jones (2010).

Direct and Indirect Impacts

Based on a review of the variations and the updates to the desktop analysis, there are no significant changes to the direct and indirect impacts discussed in the Final BA. The new information does not change the effects of the Project on the Sprague's pipit in a manner or to an extent not analyzed in the original BA.

Effects Determination

The incorporation of the 22 variations into the APR does not result in significant changes to the potential for, or magnitude of, direct and indirect impacts or reveal effects of the Project that may affect the Sprague's pipit in a manner or to an extent not analyzed in the Final BA. As identified in the Final BA, any unavoidable or unforeseen impacts that could occur as a result of the Project are expected to be insignificant or discountable and would not result in take. Therefore, the Project "may affect, but is not likely to adversely affect" Sprague's pipit.

4.10 Whooping Crane

Clean Line identified four variations to the original APR that occur within the Action Area for the whooping crane. The following table identifies each of the four variations that occur within the whooping crane migration corridor and the corresponding Route Variation Analysis that describes each.

County	Variation ID	Route Variation Analysis
Woodward County, OK	Region 2, Link 1, Variation 1	Data Request 2, Response 3
Major County, OK	Region 2, Link 2, Variation 2	Supplemental Information #2 to Data Request 2, Response 1
Payne County, OK	Region 3, Link 1, Variation 2	Response to Data Request 1, Part 2
Payne County, OK	Region 3 Links 1 and 2, Variation 1	Response to Data Request 2

Additional Desktop/Field Analysis

Clean Line analyzed whooping crane stopover habitat within the species' Action Area, incorporating the four variations. Using the habitat assessment model summarized in the Final BA and detailed in the "Whooping Crane Habitat Suitability Assessment Model" (Appendix G of the Final BA), no additional low quality wetlands were identified within the Action Area.

Direct and Indirect Impacts

Based on a review of the variations and the updates to the desktop analysis, there were no additional low quality wetlands identified within the Action Area, therefore, no significant changes to the direct and indirect impacts discussed in the Final BA are expected. The new information does not change the effects of the Project on the whooping crane or critical habitat in a manner or to an extent not analyzed in the Final BA.

Effects Determination

The incorporation of the four variations into the APR does not result in any changes to the potential for, or magnitude of, direct and indirect impacts or reveal effects of the Project that may affect whooping cranes in a manner or to an extent not analyzed in the Final BA. As identified in the BA, there are a lack of confirmed sightings and a relatively limited availability of low quality, suitable stopover roosting habitats in the Action Area. Clean Line would further minimize the already low potential for impacts on whooping cranes with the protection measures detailed in the Final BA. For these reasons, the Project "may affect, but is not likely to adversely affect" the whooping crane.

5.0 Conclusions

Based on a review of the potential direct and indirect effects associated with the construction, operations, maintenance, and decommissioning of the Project, the adjustments to the APR to reflect the 22 route variations will not change the effects determinations made in the Final BA. This following effects determinations were confirmed:

> The Project ***may effect, but is not likely to adversely affect*** the following 19 species: *geocarpon, pondberry, Curtis pearly mussel, fat pocketbook, pink mucket, rabbitsfoot* (includes critical habitat), *scaleshell mussel, snuffbox, speckled pocketbook, spectaclecase, Arkansas darter, Arkansas River shiner* (includes critical habitat), *pallid sturgeon, Ozark hellbender, interior least tern, piping plover, red knot* (rufa subspecies), *Sprague's pipit,* and *whooping crane*.
>
> The Project would have ***no effect*** on 5 species: *fanshell, Neosho mucket, Ozark cavefish, yellowcheek darter*, and *Florida panther*.
>
> The Project is ***likely to adversely affect*** 6 species: *American burying beetle, gray bat, Indiana bat, northern long-eared bat, Ozark big-eared bat*, and *lesser prairie-chicken*.

Appendix A
Overview Maps

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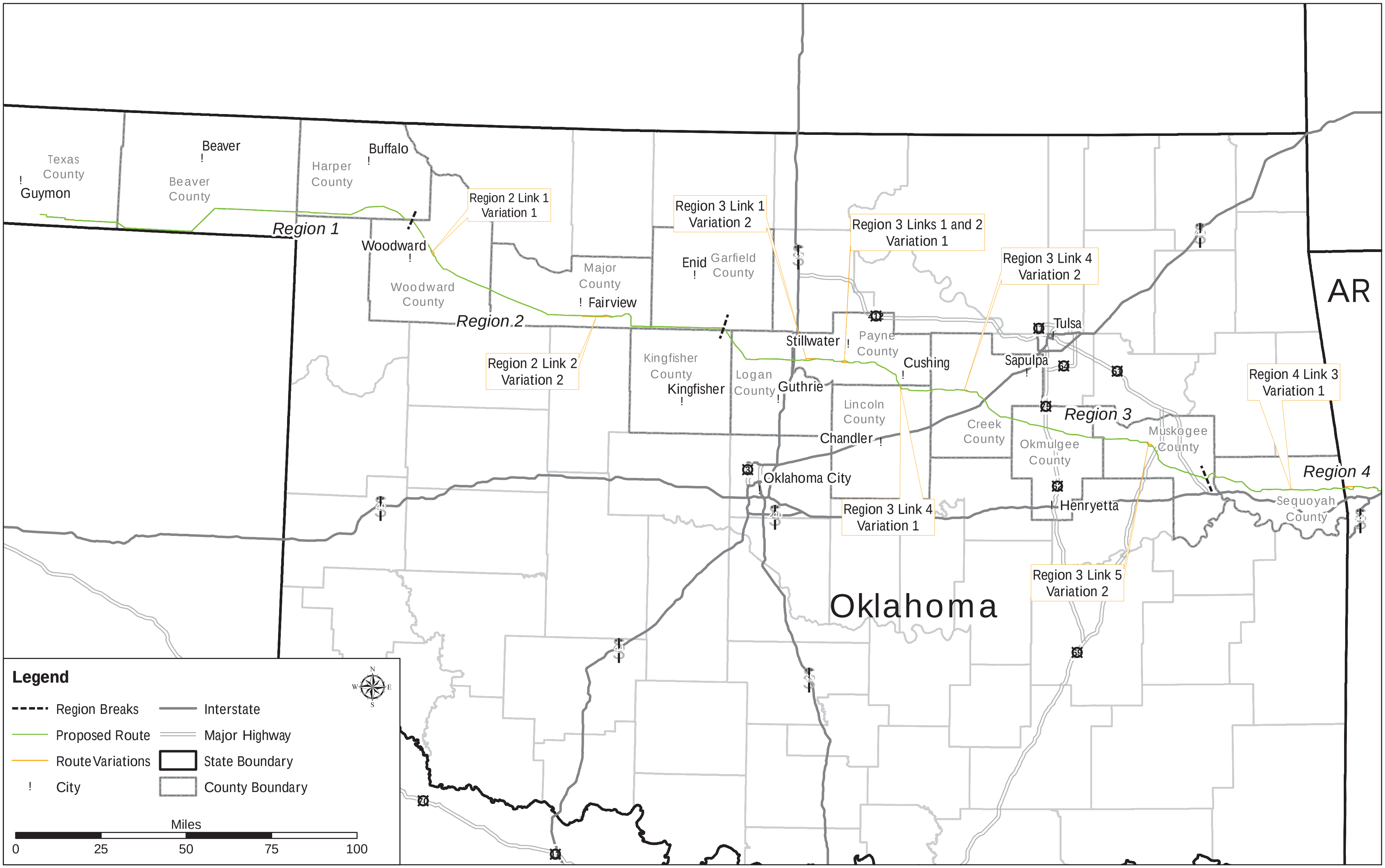
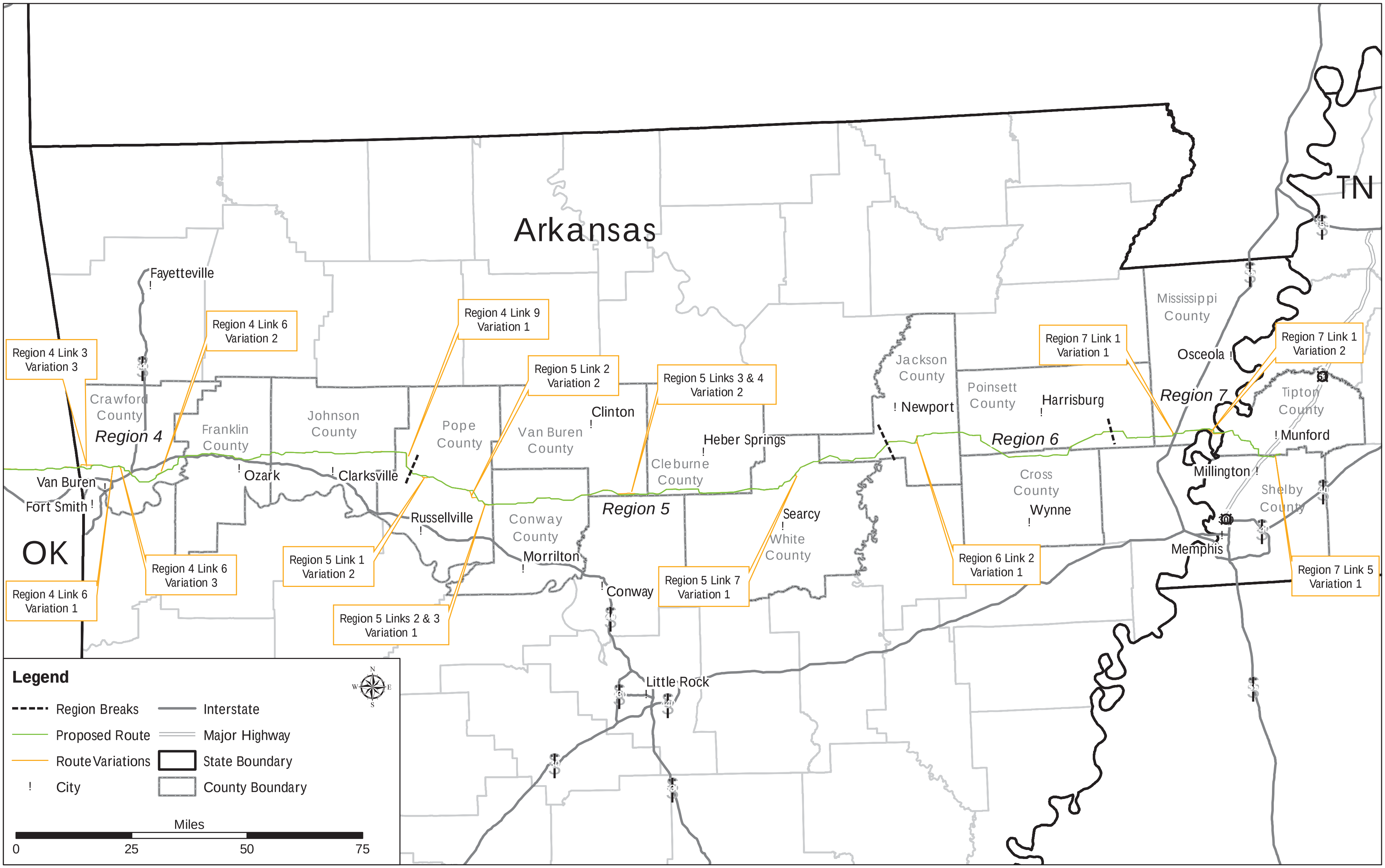

AR
Oklahoma
Texas County
Guymon
Beaver
Beaver County
Harper County
Buffalo
Woodward
Woodward County
Major County
Fairview
Enid
Garfield County
Kingfisher County
Kingfisher
Logan County
Guthrie
Stillwater
Payne County
Cushing
Lincoln County
Chandler
Oklahoma City
Creek County
Sapulpa
Tulsa
Okmulgee County
Henryetta
Muskogee County
Sequoyah County
Region 1
Region 2
Region 3
Region 4
Region 2 Link 1 Variation 1
Region 2 Link 2 Variation 2
Region 3 Link 1 Variation 2
Region 3 Links 1 and 2 Variation 1
Region 3 Link 4 Variation 2
Region 3 Link 4 Variation 1
Region 3 Link 5 Variation 2
Region 4 Link 3 Variation 1
Legend
Region Breaks
Proposed Route
Route Variations
City
Interstate
Major Highway
State Boundary
County Boundary
Miles
0
25
50
75
100



Arkansas
TN
OK
Fayetteville
Van Buren
Fort Smith
Ozark
Clarksville
Russellville
Morrilton
Conway
Clinton
Heber Springs
Searcy
Little Rock
Newport
Harrisburg
Wynne
Osceola
Millington
Munford
Memphis
Crawford County
Franklin County
Johnson County
Pope County
Van Buren County
Conway County
Cleburne County
White County
Jackson County
Poinsett County
Cross County
Mississippi County
Tipton County
Shelby County
Region 4
Region 5
Region 6
Region 7
Region 4 Link 3 Variation 3
Region 4 Link 6 Variation 1
Region 4 Link 6 Variation 2
Region 4 Link 6 Variation 3
Region 4 Link 9 Variation 1
Region 5 Link 1 Variation 2
Region 5 Link 2 Variation 2
Region 5 Links 2 & 3 Variation 1
Region 5 Links 3 & 4 Variation 2
Region 5 Link 7 Variation 1
Region 6 Link 2 Variation 1
Region 7 Link 1 Variation 1
Region 7 Link 1 Variation 2
Region 7 Link 5 Variation 1
Legend
Region Breaks
Proposed Route
Route Variations
City
Interstate
Major Highway
State Boundary
County Boundary
Miles
0
25
50
75

Appendix B
Route Variation Analysis

Appendix B – Route Variation Analysis

DISCLAIMER: This Appendix to the Addendum to the Final Biological Assessment has been removed because it is duplicated in Appendix M of the Final EIS.

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Appendix C
Project Description for the Plains & Eastern Clean Line (Revision 3.0, June 2015)

Appendix C – Project Description

DISCLAIMER: This Appendix to the Addendum to the Final Biological Assessment has been removed because it is duplicated in Appendix F of the Final EIS. The Project Description (Revision 3.1, September 2015) in the Final EIS has minor edits to Table 2-4, Section 2.2.2, 3.2.3, 4.3, and 4.4 as compared to the Project Description (Revision 3.0, June 2015) submitted to the U.S. Fish and Wildlife Service on July 14th, 2015.

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APPENDIX P

DRAFT PROGRAMMATIC AGREEMENT

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PROGRAMMATIC AGREEMENT

AMONG THE

**U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION,
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,**

AND

CHEROKEE NATION

**REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE TRANSMISSION PROJECT
PLANNING AND CONSTRUCTION PHASES**

1. **Whereas**, Section 1222(b) of the Energy Policy Act of 2005 authorizes the U.S. Department of Energy (DOE), acting through and in consultation with the Southwestern Power Administration (Southwestern or SWPA; collectively, DOE), to participate with other entities in designing, developing, constructing, operating, maintaining, or owning new electric power transmission facilities and related facilities located within any state in which Southwestern operates, herein referred to as "participation," and DOE accordingly issued a Request for Proposals (RFP) for New or Upgraded Transmission Line Projects in June 2010;

2. **Whereas**, Clean Line Energy Partners LLC of Houston, Texas, the parent company of Plains and Eastern Clean Line LLC and Plains and Eastern Clean Line Oklahoma LLC (collectively, Clean Line), submitted an application in July 2010 in response to the RFP consisting of the Plains & Eastern Clean Line Transmission Project (Project), and DOE concluded that Clean Line's modified proposal dated August 17, 2011, for the proposed Project was responsive to the RFP;

3. **Whereas**, prior to making a determination whether to participate in the proposed Project, DOE must fully evaluate the proposed Project, in consultation with Southwestern;

4. **Whereas**, DOE finds that its participation in the Project is an undertaking subject to Section 106 of the National Historic Preservation Act (NHPA; 54 USC §306108) and its implementing regulations, "Protection of Historic Properties" (36 CFR Part 800);

5. **Whereas**, the proposed Project would traverse portions of Texas, Oklahoma, Arkansas, and Tennessee and would consist of construction, operation, and maintenance of an approximately 720-mile overhead 600-kilovolt (kV) high voltage direct current (HVDC) transmission line with the capacity to deliver approximately 3,500 megawatts (MW) from the Oklahoma Panhandle region to load-serving entities in the Mid-South and Southeast United States via a transmission system interconnection operated by the Tennessee Valley Authority (TVA) in Tennessee;

6. **Whereas**, the western portion of the proposed Project would interconnect to the transmission system operated by the Southwest Power Pool in Texas County, Oklahoma;

7. **Whereas**, a new alternating current (AC)/direct current (DC) converter station would be built at each end of the transmission line. Each would require the use of approximately 45 to 60 acres and would be located on private land, in Texas County, Oklahoma, and Shelby County, Tennessee, respectively. Clean Line and DOE are also evaluating an intermediate AC/DC converter station in Pope County, Arkansas, which would require the use of 20 to 35 acres and would be located on private land. This AC/DC converter station would potentially deliver up to an additional 500MW via a 500kV transmission line interconnection with Midcontinent Independent System Operator, Inc. (MISO);

8. **Whereas**, in addition to the HVDC line, the proposed Project would include four to six AC transmission lines of up to 345kV interconnecting the Oklahoma converter station with new wind generation facilities that would be located in parts of the Oklahoma and Texas Panhandle regions within approximately 40 miles of the Oklahoma converter station;

9. **Whereas**, the proposed Project would include the following: permanent and temporary roads and other overland access; improvements to existing roads; temporary construction work areas; ancillary facilities, such as communications facilities for access control and protection; and construction right-of-way (ROW) for the HVDC and AC transmission line routes, the converter stations, interconnections, all access roads, work areas, and ancillary facilities;

10. **Whereas,** DOE is consulting with the Oklahoma State Historic Preservation Office, the Oklahoma Archaeological Survey, the Arkansas State Historic Preservation Office, the Tennessee State Historic Preservation Office, and the Texas State Historic Preservation Office (collectively, State Historic Preservation Offices or SHPOs). These SHPOs are all Signatories to this PA pursuant to 800.6(c)(1)(ii);

11. **Whereas**, DOE recognizes its government-to-government obligation to consult with Federally-recognized Indian Tribes and Nations that may attach traditional religious and cultural significance to historic properties, including historic properties located off Tribal lands and those Traditional Cultural Properties that are eligible for the National Register of Historic Places, that may be affected by the undertaking. DOE initiated consultation for this undertaking by letters dated January 14 and January 17, 2013, sent to the Caddo Nation of Oklahoma, Cherokee Nation, Comanche Nation, Iowa Tribe of Oklahoma, Kiowa Indian Tribe of Oklahoma, the Muscogee (Creek) Nation, the Osage Nation, the Quapaw Tribe of Oklahoma, Sac and Fox Nation, Cheyenne and Arapaho Tribes, Tonkawa Tribe of Indians of Oklahoma, Wichita and Affiliated Tribes, Absentee-Shawnee Tribe of Indians of Oklahoma, Alabama Quassarte Tribal Town, Apache Tribe of Oklahoma, the Choctaw Nation of Oklahoma, Delaware Nation, Delaware Tribe of Indians, Eastern Band of Cherokee Indians, Kaw Nation, Kialegee Tribal Town, the Modoc Tribe of Oklahoma, Santee Sioux Nation, Seneca-Cayuga Nation, Thlopthlocco Tribal Town, United Keetoowah Band of Cherokee Indians in Oklahoma, Fort Sill Apache Tribe of Oklahoma, and the Chickasaw Nation, pursuant to 36 CFR §800.2(c)(2);

12. **Whereas**, DOE is consulting on a government-to-government basis pursuant to 36 CFR §800.14(f) with the Cherokee Nation and its Tribal Historic Preservation Officer. Because the proposed Project spans the Arkansas riverbed, which constitutes tribal land under 36 CFR §800.16(x), the Cherokee Nation is a Signatory to this PA pursuant to 36 CFR §800.6(c)(1)(ii);

13. **Whereas**, DOE is consulting on a government-to-government basis pursuant to 36 CFR §800.14(f) with the Absentee-Shawnee Tribe of Indians of Oklahoma, the Chickasaw Nation, the Choctaw Nation of Oklahoma, Iowa Tribe of Oklahoma, the Muscogee (Creek) Nation, the Osage Nation, the Quapaw Tribe of Oklahoma, Sac and Fox Nation, Thlopthlocco Tribal Town, United Keetoowah Band of Cherokee Indians in Oklahoma, and Wichita and Affiliated Tribes and the relevant Tribe's or Nation's Tribal Historic Preservation Officers (THPOs) recognized by the National Park Service pursuant to 54 USC § 302702 (collectively, consulting Tribes and Nations). These consulting Tribes and Nations are all Invited Signatories to this PA pursuant to an invitation extended by DOE under 36 CFR §800.6(c)(2)(ii) and as set forth under 36 CFR §800.6(c)(2)(i)-(iv);

14. **Whereas**, DOE acknowledges that Tribes possess special expertise in assessing the National Register eligibility of properties with religious or cultural significance to them. DOE is aware that frequently historic properties of religious and cultural significance are located on ancestral, aboriginal, or ceded lands of Tribes. For the purposes of this Section 106 consultation and this Programmatic Agreement (PA), the Chickasaw Nation, the Choctaw Nation of Oklahoma, the Muscogee (Creek) Nation, the Osage Nation, and United Keetoowah Band of Cherokee Indians in Oklahoma have identified their respective Tribal areas of interest in the maps provided in Appendix A. Indian Tribes or Nations have been provided a reasonable opportunity to identify concerns about historic properties; advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance; articulate views on the undertaking's potential effects on such properties; and participate in the resolution of adverse effects pursuant to 36 CFR §800.2(c)(2)(ii)(A);

15. **Whereas**, DOE has determined that the undertaking may have an adverse effect on properties listed or eligible for listing on the National Register of Historic Places (NRHP), which includes historic properties of traditional religious and cultural importance to consulting Indian Tribes and Nations, including graves that may contain human remains and/or associated cultural items. DOE recognizes that the respectful treatment of human remains and funerary objects is a paramount concern and that the views of living descendants and the Tribes and Nations participating in this consultation must be considered in the decision-making process;

16. **Whereas**, on February 12, 2014, the Advisory Council on Historic Preservation (ACHP) entered into consultation based on its determination that the Criteria for Council Involvement in Reviewing Individual Section 106 Cases (36 CFR §800 Appendix A) were met because the undertaking has the potential to have substantial impacts on historic properties and may present procedural questions. The ACHP is a Signatory to this PA pursuant to 36 CFR 800.6(c)(1)(ii);

17. **Whereas,** Clean Line will need to obtain permits and other approvals and authorizations from other agencies to construct, operate, maintain, and decommission certain elements of the proposed Project;

18. **Whereas**, TVA is a Federally-owned corporation from which approvals would be needed before interconnecting the proposed Project to TVA's transmission system in the Tennessee Valley region. TVA will rely, to the extent permitted by law, on this Section 106 consultation and this PA to fulfill its obligations under Section 106 of the NHPA for any action, permit, or approval by TVA for the Project. The TVA is a Signatory to this PA pursuant to 800.6(c)(1)(ii);

19. **Whereas**, the Bureau of Indian Affairs (BIA) is a bureau within the Department of the Interior responsible for the administration of land held in trust and/or subject to restrictions for American Indians and Federally-recognized Tribes, and the BIA is recognized to have jurisdiction by law over ROWs over Indian Lands (25 CFR Part 169). The BIA, Eastern Oklahoma Region, will, to the extent permitted by law, implement Section 101(d)(6) [54 USC 302706] and this PA to fulfill its obligations under Section 106 of the NHPA for this undertaking. The BIA, Eastern Oklahoma Region is a Signatory to this PA pursuant to 800.6(c)(1)(ii);

20. **Whereas**, the U.S. Fish and Wildlife Service (USFWS) is a bureau within the Department of the Interior and has jurisdiction by law and/or has special expertise regarding the Endangered Species Act (16 USC § 1531 et seq.), Migratory Bird Treaty Act (16 USC § 703 et seq.), Bald and Golden Eagle Protection Act (16 USC § 668 et seq.), The National Wildlife Refuge System Administration Act (16 USC § 668dd–68ee), Executive Order 13186, and DOE and USFWS Memorandum of Understanding (dated September 12, 2013). Therefore, the USFWS is a Consulting Party for this Section 106 consultation and the development of this PA;

21. **Whereas**, DOE is required under the NHPA and 36 CFR §800.10 to invite the Secretary of the Interior to consult when undertakings have the potential to adversely affect National Historic Landmarks (NHLs), and the Secretary of the Interior has assigned this consultation responsibility to the National Park Service (NPS). Further, Congress has assigned the NPS to administer the National Trails System, including the Trail of Tears, and Route 66 Corridor Preservation Program. Therefore, the NPS is a Consulting Party for this Section 106 consultation and the development of this PA;

22. Whereas, two NHLs – the Stamper Site National Historic Landmark (Texas County, Oklahoma) and Honey Spring Battlefield National Historic Landmark (McIntosh & Muskogee counties, Oklahoma) – may be found within the Area of Potential Effects for the undertaking, and DOE will continue to consult regarding its efforts, to the maximum extent possible, to undertake such planning and actions as may be necessary to minimize harm to such landmarks;

23. **Whereas**, TVA and BIA have designated DOE as the lead Federal agency for purposes of this Section 106 consultation in accordance with 36 CFR §800.2(a)(2);

24. **Whereas,** this PA addresses stipulations for the planning and construction phases of the proposed Project and does not address further operations and maintenance stipulations beyond the very preliminary planning stages for the operations and maintenance project phase;

25. **Whereas**, Clean Line, as the applicant for Federal approval, has participated as a Consulting Party in consultations for this undertaking, has been authorized by DOE to initiate consultation with the SHPOs and others pursuant to 36 CFR §800.2(c)(4) by letters dated January 17, 2013 to the Arkansas, Tennessee, and Oklahoma SHPOs and April 23, 2013 to the Texas SHPO, and is an Invited Signatory to this PA pursuant to an invitation extended by DOE under 36 CFR §800.6(c)(2);

26. **Whereas**, DOE has invited local governments, including local municipalities and county governments, by letters dated August 19, 2014, as listed in Appendix B, to participate in this Section 106 consultation and development of this PA, under 36 CFR §800.2(c)(3), and Woodward County, Oklahoma, is a Consulting Party.

27. **Whereas,** organizations with a demonstrated interest in the undertaking due to their concern with the undertaking's potential effects on historic properties have been invited to participate as consulting parties in this Section 106 consultation and development of this PA under 36 CFR §800.2(c)(5);

28. **Whereas,** for the purposes of this PA, Consulting Parties are parties that have consultative roles in the Section 106 consultation under 36 CFR §800.2[1]; Signatories are parties with sole authority to execute, amend, or terminate this PA under 36 CFR §800.6(c)(1); Invited Signatories are parties that sign this PA at the invitation of DOE under §800.6(c)(2) and by signing have the same rights with regard to seeking amendment or termination of this PA as other signatories except that refusal of any party invited to become a signatory to this PA does not invalidate this PA, as set forth in §800.6(c)(2)(i)-(iv); and Concurring Parties are parties invited to concur in the PA under 36 CFR §800.6(c)(3).[2]

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[1] For purposes of this PA, the Consulting Parties to this PA are identified in Appendix C.
[2] There are no Concurring Parties to this PA. DOE invited several parties to sign as Concurring Parties, but these Parties chose to remain Consulting Parties and declined to sign as Concurring Parties.

29. **Whereas**, in accordance with 36 CFR §800.8(c), DOE is using the process and documentation required for the preparation of the Plains & Eastern Clean Line Environmental Impact Statement and Record of Decision to comply with Section 106 in lieu of the procedures set forth in 36 CFR §800.3 through §800.6, notified the ACHP and SHPOs of its intent to do so by letters dated November 8, 2012, November 20, 2012, April 16, 2013, and January 10, 2014, and is involving the public as required by 36 CFR §800.2(d) and §800.14(b)(2)(ii) through the National Environmental Policy Act process;

30. **Whereas**, in accordance with 36 CFR §800.4(b)(2), §800.5(a)(3), and §800.14(b)(1)(i) and (ii), DOE has elected to phase identification and evaluation of historic properties and application of the criteria of adverse effect using a PA because the undertaking under consideration consist of large land areas, because the potential effects on historic properties are multi-state in scope, because this type of project (transmission line development) results in effects that are similar and repetitive across certain classes of historic properties, and because effects to historic properties cannot be fully determined prior to approval of the undertaking. Completion of the identification and evaluation of historic properties, determinations of adverse effect on historic properties, determinations of resolution of adverse effects to historic properties, and consultation concerning measures to avoid, minimize, or mitigate any adverse effects will be carried out in phases according to the procedures set forth in this PA;

31. **Whereas**, DOE, acting through and in consultation with SWPA’s Administrator, will decide whether to participate with Clean Line in the Project through evaluating statutory criteria including the completed NEPA process, documented by a Record of Decision, and will condition its participation on Clean Line’s compliance with the terms of this PA;

32. **Now, therefore**, DOE and SWPA; Oklahoma State Historic Preservation Office; Oklahoma Archaeological Survey; Arkansas State Historic Preservation Office; Tennessee State Historic Preservation Office; Texas State Historic Preservation Office; Cherokee Nation; Absentee-Shawnee Tribe of Indians of Oklahoma; the Chickasaw Nation; the Choctaw Nation of Oklahoma; Iowa Tribe of Oklahoma; the Muscogee (Creek) Nation; the Osage Nation; the Quapaw Tribe of Oklahoma; Sac and Fox Nation; Thlopthlocco Tribal Town; United Keetoowah Band of Cherokee Indians in Oklahoma; Wichita and Affiliated Tribes; ACHP; TVA; BIA, Eastern Oklahoma Region; and Clean Line agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

STIPULATIONS

DOE, in coordination with SWPA, BIA, and TVA, will ensure that the following stipulations are implemented upon execution of this PA.

I. Roles and Responsibilities

DOE acknowledges that as lead Federal agency, it is responsible for the implementation of the following stipulations, including through independent review of the plans and reports prepared under this PA by qualified personnel. All Signatories and Invited Signatories acknowledge that they have responsibility for supporting certain aspects of this PA. The ACHP, SHPOs, and consulting Tribes and Nations, including THPOs, will participate in the decision-making process relative to cultural resources that are determined by DOE to be eligible for the NRHP. Federal agencies that sign this PA as Signatories will have specific responsibilities relative to their jurisdiction over specific land or through the issuance of various permits required for the Project.

II. Standards and Permits

Unless expressly defined in this PA, all terms used in this PA and defined in 36 CFR §800.16 shall have the same meanings and be defined in accordance with 36 CFR §800.16 in effect as of the Effective Date of this PA.

A. Professional Qualifications

DOE will ensure that identification and evaluation studies and treatment measures required under the terms of this PA will be carried out by or under the direct supervision of professionals who meet, at a minimum, the *Secretary of the Interior's Historic Preservation Professional Qualification Standards* for Archaeology, History, or Architectural History, 36 CFR Part 61, Appendix A, as appropriate, as well as the relevant SHPO requirements. Oklahoma, Arkansas, and Texas require that the Principal Investigator for historic properties review meet or exceed the Secretary of the Interior's standards in the appropriate field of review. Whether a Tribal monitor is qualified to perform monitoring activities under this PA shall be determined by the Tribe or Nation invited to participate in monitoring activities as set forth below in Stipulation V.

B. Fieldwork and Reports

DOE will ensure that reporting meets the requirements of the Secretary of Interior's *Standards and Guidelines for Archeology and Historic Preservation* as amended (48 FR 44716), including the Secretary of Interior's *Standards for Evaluation*. Current state standards will be used where applicable, including the following:

1. Oklahoma SHPO's *Review and Compliance Manual; Architectural/Historic Resources Survey: A Field Guide; SHPO Fact Sheet #4: Historic Preservation*

Resource Identification; SHPO Fact Sheet #10: Frequently Asked Questions about Section 106 review; SHPO Fact Sheet #12: Evaluating Historic Period Archeological Sites for the National Register under Section 106 with Particular Reference to Sites Dating After 1890; SHPO fact Sheet #15: Oklahoma Historic Property Record Guidelines; and SHPO Fact Sheet #16: Guidelines for Developing Archeological Survey Reports in Oklahoma and Report Components.

2. *Guidelines for Archeological Fieldwork and Report Writing in Arkansas*, as revised and in effect January 1, 2010, and *A State Plan for the Conservation of Archeological Resources in Arkansas* in effect as of the Effective Date of this PA.

3. Tennessee SHPO's Tennessee Standards and Guidelines for Archaeological Resource Management Studies as revised in March 2009.

4. *Archeological Survey Standards for Texas* by the Council of Texas Archeologists and Texas Historical Commission.

C. Permits

DOE or Clean Line, as appropriate, will obtain any required permit(s) from applicable Federal, State or Tribal authorities for archaeological fieldwork performed under this PA.

III. Confidentiality and Withholding of Sensitive Information

DOE, other Signatories, and Invited Signatories agree to maintain the confidentiality of the locations of all archaeological and reburial sites and of other information pertaining to historic properties (collectively, sensitive information) to the extent permissible under applicable law. During this Section 106 consultation and under the terms of this PA, sensitive information was and will continue to be generated, submitted, and/or included in documentation to be generated and/or submitted to Federal and State agencies that sign this PA. For sensitive information and any documentation containing sensitive information generated by a Federal agency that signs this PA, to the extent permitted by applicable law, the permission of that agency is required before any dissemination of such information by any Signatory or Invited Signatory to this PA. For sensitive information and documentation containing sensitive information generated or held by a Federal agency that signs this PA, should a conflict arise between any Signatory or Invited Signatory about the releasability of the sensitive information or of the documentation containing the sensitive information, the Federal agency that signs the PA and that generated or holds the sensitive information or documentation containing the sensitive information will contact the Secretary of the Interior to implement the provisions set forth in Section 304 of the NHPA (54 USC §307103) and 36 CFR §800.11(c). Pending implementation of the Section 304 provisions, the confidentiality of the information must be preserved by all Signatories and Invited Signatories. Consulting Parties are encouraged to abide by this stipulation as well.

IV. Area of Potential Effects

A. Defining the Area of Potential Effect (APE)

DOE, in consultation with the SHPOs, consulting Tribes and Nations, including THPOs, and Federal agencies, has defined and documented the APE for this undertaking as required in 36 CFR §800.4(a)(1) below. DOE may modify the APE in accordance with Stipulation IV.B of this PA. Disputes regarding modifications to the APE will employ the process described in Stipulation XII, Dispute Resolution, of this PA.

Pursuant to 36 CFR §800.16(d), the APE is defined as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of properties listed in or eligible for listing in the NRHP, including TCPs, historic properties of traditional religious and cultural significance, National Historic Landmarks, and National Historic Trails. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking. The APE for direct effects and the APE for indirect effects for this undertaking are identified below. The APE for direct effects and the APE for indirect effects, when referred to together, are called simply "the APE."

1. APE for Direct Effects

    a. The APE for direct effects for the HVDC transmission line, AC Collection System transmission lines, and AC interconnection transmission lines will be the length and width of all ROW easements for these Project components. The APE for these components will also include easements acquired for other proposed permanent Project features and temporary workspaces, including marshalling yards, storage areas, and waste disposal areas, as appropriate. The APE for direct effects for temporary workspaces associated with these Project components will be the limits of the disturbed areas.

    b. The APE for direct effects for new access roads in areas outside of the Project components described in part a. above will be the full length and width of the new access road easement. For existing access roads that are improved as part of the Project, the APE for direct effects will be the limits of the disturbed areas.

    c. The APE for direct effects for other permanent Project facilities such as converter stations, substations, and ancillary facilities, as well as temporary work areas associated with these Project components will be the limits of the disturbed areas.

d. The APE for direct effects excludes existing roads that the proposed Project will use but not improve, and existing facilities to which the proposed Project will interconnect, but not expand.

2. APE for Indirect Effects

The APE for indirect effects is the geographic area including and extending from the APE for direct effects (defined above) where the undertaking has the potential to indirectly cause alterations to the character or use of a historic property (such as its physical features, setting, viewshed, or auditory character) that qualify a property for inclusion on the NRHP.

a. The APE for indirect effects is the area measured up to 0.5 miles from above-grade features of the Project, or within the extent of the viewshed, whichever is closer. Indirect visual effects from temporary access roads occurring at ground level and similar work areas without an above-ground profile will not be considered when defining the APE for indirect effects.

b. Where the APE for indirect effects includes historic properties that are historic properties of traditional religious and cultural significance, TCPs, National Historic Landmarks, or National Historic Trails for which setting, feeling, and/or association contribute to eligibility, additional analyses may be required and the APE for indirect effects may be modified accordingly following procedures at Stipulation IV.B below.

3. Cumulative Effects

For the purposes of this PA, cumulative effects will be analyzed using the same geographic areas as those defined for the APE. Under 36 CFR §800.5(a)(1), adverse effects may include reasonably foreseeable effects that may occur later in time, be farther removed in distance, or be cumulative. If, in the future, there is a Federal role in future development associated with the proposed Project (for example, a proposed wind generation facility as described in Whereas Clause 8), then the Federal agency with that role would comply with Section 106 at an appropriate time.

B. Modifying the APE

The APE, as currently defined in Stipulation IV.A above, encompasses areas sufficient to accommodate all of the components of the undertaking under consideration as of the date of the execution of this PA.

1. If DOE, in consultation with Signatories and Invited Signatories, determines that the proposed Project or proposed changes to the proposed Project within the scope of the undertaking may cause adverse effects to historic properties that were not foreseeable at the time the PA was executed beyond the extent of the established APE, then DOE may use the process set forth herein to determine whether to modify the APE.

2. In addition to subparagraph 1 above, any Signatory or Invited Signatory to this PA may propose that an APE be modified by providing a written proposal to DOE, including justification and description of the requested APE modification, with copies to the Consulting Parties. DOE shall consult with the Consulting Parties for no more than 30 calendar days in an effort to reach consensus on the proposed modification. If the Signatories and Invited Signatories agree to modify the APE consistent with the proposal, DOE will render a decision consistent with that agreement and will notify the Consulting Parties of the decision. If the Signatories and Invited Signatories cannot agree to modify the APE consistent with the proposed modification, then DOE will consider the concerns expressed by the Signatories and Invited Signatories, render a decision, and notify the Consulting Parties of that decision.

3. DOE’s decision to modify the APE will not require an amendment to the PA. Regardless of whether there is agreement among the Consulting Parties as to the scope of the modified APE, the modified APE will be attached to the PA as a new appendix and become effective upon distribution by DOE to the Signatories and Invited Signatories.

4. If the APE is modified at any time during the term of the PA, Clean Line will carry out the work under the Historic Properties Identification Plan (HPIP) and/or Historic Properties Treatment Plan (HPTP) (defined in Stipulation V.A. through V.C. below), as appropriate, for the modified APE. Depending on when the APE is modified, Clean Line may carry out the work under the HPIP(s) and HPTP(s) by means of appendices.

V. Phased Process to Address Historic Properties

A. Identification and Evaluation of Historic Properties

1. As explained in Whereas Clause 28, DOE, in consultation with the Consulting Parties, will perform a phased identification and evaluation of historic properties within the APE.

2. Should National Historic Landmarks be identified within the APE, DOE will, to the maximum extent possible, undertake appropriate planning as defined in Section 110(f) of the NHPA (recodified at 54 USC §306107) and 36 CFR §800.10.

3. Clean Line will invite Tribal Monitors to participate in identification efforts, including initial survey, field investigations and mechanical excavation for archaeological deep testing, in the Tribe or Nation's pre-designated high priority areas as described in the HPIP (Appendix E). Subject to Stipulation III above, Clean Line will distribute to the Tribes or Nations that sign this PA as a signatory or Invited Signatories, as appropriate, relevant information, in geographic information system (GIS) format, about identified archaeological sites in such Tribe or Nation's area of interest, to facilitate Tribal monitoring. For purposes of this paragraph, relevant information includes site boundary to the extent known, site type, and basic descriptive or defining features.

4. Clean Line has prepared an HPIP with oversight from DOE and in consultation with the Consulting Parties (Appendix E). DOE will ensure that the HPIP covers the APE. In accordance with NHPA Section 106 and 36 CFR §800.4 and §800.5, the HPIP includes a strategy for the identification of historic properties, through evaluation of cultural resources in the APE and including evaluation of historic significance and eligibility to the NRHP, and provides protocols for fulfilling identification requirements, including field methods.

    a. The HPIP includes the process and protocols for Tribal Monitors' participation in the identification efforts (see sub-stipulation 3 above).

    b. The HPIP identifies report(s) that Clean Line will prepare documenting the results of the implementation of the HPIP. The report(s) will include recommendations concerning the historic significance of cultural resources within the APE (i.e., eligibility for listing on the NRHP), preliminary assessments of the potential Project effects on these historic properties, and initial recommendations for the treatment of historic properties.

    c. The HPIP includes the process and criteria for assessing adverse effects to those resources deemed eligible for listing on the NRHP (historic properties).

B. Treatment of Historic Properties

1. Treatment of adverse effects on historic properties from the undertaking will be considered in the preferred order of avoidance, minimization, and mitigation.

2. Should the Project be modified prior to initiation of construction of the Project such that the potential for adverse effects to historic properties are avoided or minimized (e.g., by such modifications, a historic property is no longer within the APE), such modifications will be taken into account in the assessment of effects to these properties and in historic property treatment.

3. Based on the final HPIP reports that Clean Line will prepare documenting the results of the implementation of the HPIP, Clean Line will prepare one or more HPTP(s) with oversight from DOE and in consultation with the Consulting Parties. The HPTPs will include the measures to avoid, minimize, and mitigate the adverse effect of the undertaking on historic properties, the manner in which these measures will be carried out, and a schedule for their implementation.

    a. Should mitigation consist of or include archaeological data recovery, the HPTP(s) will identify the specific research questions to be addressed by data recovery with an explanation of their relevance and the archaeological methods to be used, subject to standards set forth in Stipulation II as applicable.

    b. The HPTP(s) will address all historic properties identified within the Project APE and include procedures and protocols to establish measures to avoid, minimize, and mitigate the adverse effect of the undertaking on historic properties, the manner in which these measures will be carried out, and a schedule for their implementation.

    c. The HPTP(s) will identify the report(s) that Clean Line will prepare documenting the results of the implementation of the HPTP(s).

    d. The HPTP(s) may include a Monitoring Plan, if appropriate, as an appendix.

        i. The Monitoring Plan will address appropriate monitoring for compliance with the HPTP during construction and restoration activities[3] for the proposed Project. It will identify monitoring objectives and the methods necessary to attain such objectives. The

[3] For purposes of this PA, "restoration activities" include, but are not limited to, decompacting, recontouring, re-seeding, and clean-up in areas disturbed during construction of the proposed Project.

Monitoring Plan will define processes and procedures for monitoring, as appropriate, historic properties identified through implementation of the HPIP. It will define processes and procedures for monitoring areas, if any, where the results of HPIP implementation indicate a high probability of discoveries (including but not limited to those potentially containing human remains or archaeological sites) during construction for which active on-site management could be useful in avoiding, minimizing, or mitigating adverse effects to historic properties in those areas.

ii. Recognizing that not every portion of the APE will contain historic properties for which monitoring for compliance with the HPTP is appropriate, not every HPTP will require a Monitoring Plan to be attached.

e. Clean Line and the Tribes or Nations may work together to define specific areas of monitoring as appropriate. Clean Line will invite Tribal Monitors to participate in monitoring construction activities in the Tribe or Nation's high priority areas within the Tribe or Nation's area of interest as documented in Appendix A. The Monitoring Plan will describe the process and protocols for Tribal Monitors' participation in construction monitoring.

C. Discovery Plan

Clean Line, in consulting with DOE and the Consulting Parties, will prepare a Discovery Plan addressing unanticipated discovery of cultural resources (under Stipulation VI) and inadvertent discovery of human remains, graves or associated funerary objects (under Stipulation VII) arising during Project construction and restoration activities, and include the Discovery Plan as an appendix to the HPTP(s). In addition to the provisions set forth in Stipulations VI and VII below, the Discovery Plan will describe:

1. The procedure for evaluation of such resources for eligibility for listing on the NRHP;

2. The procedure for assessment of adverse effects on such resources if deemed eligible for listing on the NRHP and therefore an historic property;

3. Treatment of an historic property including processes and procedures for consultation among the Consulting Parties;

4. Notification information, including contact by telephone and email of each Point of Contact (defined in Stipulation IX below) for each Consulting Party, to be contacted in case of discovery; and,

5. Processes and procedures to employ in the event of an unanticipated discovery, including:

   a. Suspension of work within an exclusion zone (as defined in Stipulation VI.1);

   b. Notification of DOE and Consulting Parties of an unanticipated discovery, as appropriate; and,

   c. Implementation of interim treatment measures to protect the unanticipated discovery from looting and vandalism or other exposure to damage.

6. Processes and procedures to employ in the event of unanticipated adverse effects to historic properties previously addressed in the course of implementing Stipulation V.A and V.B.

D. Plan and Report Commenting Procedures and Timeframes

For all plans and reports submitted pursuant to this Stipulation by Clean Line for review by DOE and Consulting Parties, the following requirements shall be implemented.

1. Clean Line shall submit the draft plan(s) identified above (HPIP, HPTP(s), and the Discovery Plan) to DOE and the Consulting Parties for review and comment. DOE and the Consulting Parties shall respond to Clean Line with comments, objections, or concerns on the plan(s) no later than 45 calendar days after receipt. Clean Line shall take those comments, objections, and concerns into account when finalizing the plan(s). Failure by DOE or the Consulting Parties to respond within 45 calendar days after receipt shall not preclude Clean Line from finalizing the plan(s) or implementing the plan(s) in accordance with this Stipulation. Should DOE or a Consulting Party object to all or part of the plan(s), DOE would consult with the objecting party or parties and Clean Line to resolve the objection(s) within 20 calendar days of receiving such objection. If the parties have not resolved the objection during the 20-calendar-day period, DOE would consider the concerns expressed by the Consulting Parties, DOE will render a decision on whether and how to modify the plan(s), and DOE will notify the Consulting Parties of that decision no more than 14 calendar days after the 20-calendar-day period ends.

2. Clean Line shall submit the final plan(s) to DOE, with copies to the Consulting Parties. No later than 15 calendar days after receipt of the plan(s), DOE shall notify Clean Line with any remaining comments or concerns. Failure by DOE to respond within 15 calendar days after receipt shall not preclude Clean Line from finalizing or implementing the plan(s) no earlier than 15 calendar days after DOE's receipt of the plan(s).

3. Clean Line shall submit draft report(s) to DOE, the Signatories, and the Invited Signatories on results of implementation of the HPIP and HPTP(s), as applicable, for review and comment. Clean Line shall submit summaries of the draft report(s) to the Consulting Parties for review and comment. All reports will be subject to Stipulation III of this PA. DOE and the Consulting Parties shall respond to Clean Line with comments, objections, or concerns on the report(s) no later than 45 calendar days after receipt. Clean Line shall take those comments, objections, and concerns into account when finalizing the report(s). Failure by DOE or the Consulting Parties to respond within 45 calendar days after receipt shall not preclude Clean Line from finalizing the report(s). Should DOE or a Consulting Party object to all or part of the report(s), DOE shall consult with the objecting party or parties and Clean Line to resolve the objection(s) within 20 calendar days. If the parties have not resolved the objection during the 20-calendar-day period, DOE will consider the concerns expressed by the Consulting Parties, render a decision on whether and how to modify the report(s), and notify the Consulting Parties of that decision no more than 14 calendar days after the 20-calendar-day period ends.

4. Clean Line shall submit the final report(s) to DOE, with copies to the Signatories and Invited Signatories. Clean Line shall submit summaries of the final report(s) to the Consulting Parties. All reports will be subject to Stipulation III on Confidentiality. No later than 15 calendar days after receipt of the report(s), DOE shall notify Clean Line with any remaining comments or concerns and indicate whether DOE approves the report(s). Failure by DOE to respond within 15 calendar days after receipt shall not preclude Clean Line from finalizing or implementing the report(s) no earlier than 15 calendar days after DOE's receipt of the report(s).

5. Because the Project may be developed in phases generally related to geographic areas, and because the protocols may vary by geographic area, the plan(s) and report(s) contemplated by this Stipulation may also be developed and finalized in phases, but prior to all Project ground-disturbing construction activities within a geographic area, as appropriate.

6. As each plan for a given phase of the Project is finalized using the procedure set forth herein, it will be attached as an Appendix to this PA and thereby be made part of this PA.

7. In accordance with this Stipulation, Consulting Parties are strongly encouraged to submit comments, objections, and concerns on the plan(s), report(s), and summaries by email to the appropriate points-of-contact identified in Stipulation IX on Communication.

VI. Unanticipated Discovery of Cultural Resources

The following procedures will be used by DOE and the Consulting Parties in the event that previously unreported and unanticipated cultural resources or unanticipated effects to historic properties are found during Project construction or restoration activities. These procedures will be included in the Discovery Plan (Stipulation V.C above) and are intended to ensure that the undertaking is in compliance with all applicable Federal and State laws and regulations, including Section 106 of the NHPA (54 USC 306108; see also 36 CFR Part 800).

If previously unidentified cultural resources or historic properties are discovered during Project construction or restoration activities, any Project personnel that detect the discovery must:

1. Immediately stop Project construction or restoration activities at the site of discovery and all Project ground-disturbing activity within a 50-meter (m) radius of the discovery (this area is herein referred to as the exclusion zone);

2. Immediately limit access to the exclusion zone according to the procedures described in the Discovery Plan;

3. Implement notification procedures described in the Discovery Plan regarding unanticipated discovery; and,

4. Implement interim treatment measures to protect the discovery from weather, looting and vandalism, or other exposure to damages.

As soon as practicable after receiving notification of an unanticipated discovery, Clean Line's and/or DOE's consulting cultural resource specialist(s) or monitor(s) will:

1. Inspect the work site to determine the extent of the discovery and ensure that work activities have halted within the exclusion zone (the "field review");

2. Ensure that the exclusion zone is clearly and adequately marked and secured;

3. Implement interim treatment measures described in the Discovery Plan, as appropriate, to protect the discovery from weather, looting and vandalism, or other exposure to damages; and,

4. Notify DOE and Consulting Parties, as appropriate, of the results of the field review in accordance with the notification procedures described in the Discovery Plan.

DOE, in consultation with the Consulting Parties, will have seven working days following notification by Clean Line's and/or DOE's consulting cultural resources specialist(s) or monitor(s) to determine the NRHP eligibility of the discovery. DOE may assume the discovery to be eligible for listing on the NRHP for the purposes of Section 106 pursuant to 36 CFR §800.13(c).

If the discovery is determined by the DOE to be eligible for listing on the NRHP, Clean Line will make a recommendation regarding adverse effects and propose treatment measures, if appropriate, consistent with 36 CFR §800.6. These measures may include but are not limited to:

1. Evaluation of archaeological resources by archaeologists meeting the standards set forth in Stipulation II;

2. Visits to the discovery by representatives of DOE and Consulting Parties, as appropriate;

3. Exploration of potential alternatives to avoid historic properties; and

4. Preparation and implementation of an HPTP under Stipulation V.B by Clean Line following the procedures set forth in Stipulation V.C.

Following receipt from Clean Line of its recommendation regarding adverse effects and proposed treatment measures, DOE, in consultation with the Consulting Parties, will have seven working days to make its determination regarding adverse effect and treatment for the discovery. Failure by DOE to make its determination within 7 working days shall not preclude Clean Line from finalizing or implementing plan(s) in accordance with this Stipulation.The Dispute Resolution stipulation of this PA (Stipulation XII) will be followed regarding any disagreements by Signatories or Invited Signatories that may arise regarding resolution of adverse effects.

VII. Inadvertent Discovery of Human Remains, Graves, or Associated Funerary Objects

Consulting Parties will consider the ACHP's Policy Statement Regarding Treatment of Burial Sites, Human Remains and Funerary Objects when addressing issues arising under this

Stipulation and related to human remains, graves, or associated funerary objects. This policy statement is available at http://www.achp.gov/docs/hrpolicy0207.pdf.

A. Federal and Tribal Lands

In the case of an unanticipated discovery of human remains, funerary objects, sacred objects or objects of cultural patrimony on Federal or Tribal lands, the applicable Federal agency or Tribe will follow the procedures outlined by NAGPRA (43 CFR Part 10, Subpart B) and the Archeological Resources Protection Act of 1979 (43 CFR Part 7 and 18 CFR Part 1312).

B. State and Private Lands

1. For cultural resource identification and during Project construction and restoration activities on non-Federal lands in Oklahoma, Arkansas, Tennessee, or Texas, DOE will ensure Clean Line and their contractors involved in the discovery will implement the following procedures:

   a. When an unmarked human burial or unregistered grave is encountered, Clean Line and their contractors will comply with Okla. Stat. Ann. 21 §1161-1168.7 (Oklahoma Burial Law), Arkansas Act 753 of 1991 (Arkansas Burial Law), the Tennessee Archaeology Code (Title 11, Chapter 6), or Texas Administrative Code (Title 13, Chapter 22), dependent on the state in which the discovery occurs.

      i. If an unmarked human burial or unregistered grave is discovered during construction, any Project personnel that detect the discovery must:

         (a) Immediately stop Project work at the site of the discovery and all Project work within the exclusion zone;

         (b) Immediately limit access to the exclusion zone according to the procedures described in the Discovery Plan;

         (c) Implement notification procedures described in the Discovery Plan regarding unanticipated discovery;

         (d) Implement interim treatment measures to protect the discovery from weather, looting and vandalism, or other exposure to damages; and

         (e) In no case will procedures at this stage include removal or other further avoidable disturbance of any human remains or other cultural items in the immediate vicinity of the discovery.

2. As soon as practicable following receipt of such notification, Clean Line's or DOE's consulting cultural resource specialist(s) or monitor(s) will:

   a. Inspect the work site to determine the extent of the discovery and ensure that work activities have halted within the exclusion zone (defined in Stipulation VI.1);

   b. Ensure that the exclusion zone is clearly and adequately marked and secured;

   c. Implement interim treatment measures described in the Discovery Plan, as appropriate, to protect the discovery from weather, looting and vandalism, or other exposure to damages until the requirements of State law have been completed; and,

   d. Notify the appropriate county sheriff's office, the Chief Medical Examiner, DOE, and Consulting Parties, as appropriate, in accordance with the notification procedures described in the Discovery Plan within 48 hours of the discovery.

3. It is anticipated that the county coroner will determine jurisdiction. If the county coroner refers the matter to the SHPO, the SHPO and the State Archaeologist have 72 hours to determine, in consultation with the Consulting Parties, as appropriate, the treatment of the discovery. Treatment may include mitigation and determinations on the disposition of the unmarked human burial or unregistered grave. Consistent with the SHPO's determination regarding treatment, Clean Line will draft a HPTP following the requirements of Stipulations V.B and V.D., except that the review periods set forth in Stipulation V.D. may be shortened, as appropriate, in consultation with the Signatories and Invited Signatories.

VIII. Curation

Curation will be carried out by Clean Line with oversight by DOE in accordance with Federal curation standards, which can be found at 36 CFR Part 79, and the relevant State standards. No tribally held lands are currently expected to be disturbed in the APE; however, should such disturbances arise, the applicable Tribe or Nation would further be consulted (through BIA or DOE as appropriate) on permitting, survey methods, and collection/curation procedures on those lands.

IX. Communication Plan

Efficient, timely, and appropriate communication among the Consulting Parties is essential to maintain smooth and on-schedule analysis and implementation under this PA. A variety of tools will be used throughout the life of the Project. These tools include email, telephone calls, memoranda, letters, and meeting minutes. It is also important to use these tools consistently to track Project progress and status.

DOE will gather designated and alternate points-of-contact (POCs) for Consulting Parties as part of this Section 106 consultation to support implementation of this PA. Consulting Parties must provide email addresses as part of the contact information that they provide to DOE. The designated and alternate POCs that have been provided to DOE are included as Appendix D to this PA. Clean Line will update the contact list throughout implementation of the PA. It is the responsibility of each Consulting Party to update their POC information should it change during the course of PA implementation. Clean Line, in coordination with DOE, will distribute updated information to the Signatories and Invited Signatories and append new contact information to the PA as it is received; this will not require amendment of the PA under Section XIV.

All Consulting Parties are strongly encouraged to communicate by email to facilitate efficiency, and communication by email will satisfy the requirements for implementation of this PA.

X. Operations and Maintenance Activities: Historic Properties Management Plan (HPMP)

A. Post-Construction

At least six months prior to the completion of construction and restoration activities, Clean Line will draft an HPMP, in coordination with DOE, to address post-construction treatment of historic properties during operations and maintenance activities related to the Project. The HPMP will apply to operations and maintenance activities following completion of construction and restoration activities and prior to decommissioning.

B. Processes and Procedures

The HPMP will define processes and procedures to facilitate appropriate consideration of historic properties throughout the life of Project operations. The HPMP will also describe processes and procedures to change the HPMP.

C. Review

Signatories and Invited Signatories to this PA may review and comment upon the HPMP consistent with the process in Stipulation V.D of this PA.

XI. Annual Reporting and Close-Out Report

A. Interim PA Report

Annually, no later than January 31st, commencing the first January after this PA goes into effect, Clean Line will prepare and distribute an Interim Report on Clean Line's actions regarding the implementation of this PA to DOE, the Signatories, and the Invited Signatories, and a summary of the Interim Report to the Consulting Parties. All reports and summaries prepared under this sub-stipulation will be subject to Stipulation III of this PA. The Interim Report will address the progress of implementation of the PA; provide an update on the status of and schedule for the proposed Project; describe preliminary results from implementation of the HPIP or HPTP(s), as appropriate; address the progress and status of the monitoring activities set forth in Stipulations V.A.3, V.B.3.d, and V.B.3.e above; and describe any relevant problems encountered in carrying out the terms of this PA. No later than 15 calendar days after receiving the Interim Report from Clean Line, any Signatory or Invited Signatory may propose that the Consulting Parties meet (either by phone or in-person) to discuss the Interim Report and implementation of this PA. As appropriate to their areas of interest, Consulting Parties will diligently endeavor to attend this meeting. Signatories and Invited Signatories who cannot attend this meeting will notify the other Signatories and Invited Signatories in the event that they cannot attend.

B. Meeting Requirements

Consulting Parties agree that an annual face-to-face meeting will be held if requested by a Consulting Party for a demonstrated purpose and need. The meeting location will be determined by consensus of the Signatories and Invited Signatories. Consulting Parties will diligently endeavor to attend this meeting. Signatories and Invited Signatories who cannot attend this meeting will so notify the other Signatories and Invited Signatories.

C. Policy Report and Data Collection

Annually, no later than October 31, Clean Line shall provide to DOE, for prior fiscal year instances, data and a supporting narrative document to assist in the compilation of the Environmental, Collaboration, & Conflict Resolution (ECCR) Policy Report. In addition, Clean Line will provide all data and information sufficient to assist DOE in the preparation of the annual Department of the Interior Federal Archaeological Activities Questionnaire.

D. Close-Out Report

No later than 12 months after completion of construction and restoration activities for the proposed Project, Clean Line will submit a draft Close-Out Report describing its actions under this PA to DOE, the Signatories, and the Invited Signatories, and a draft summary of the Close-Out Report to the Consulting Parties. All reports and summaries prepared under this sub-stipulation will be subject to Stipulation III of this PA. The Close-Out Report will address implementation of this PA; briefly describe the results from implementation of Stipulation V, Phased Process to Address Historic Properties, implementation of Stipulation VI, Unanticipated

Discovery of Cultural Resources, and implementation of Stipulation VII, Inadvertent Discovery of Human Remains, Graves, or Associated Funerary Objects; briefly describe curation activities performed under Stipulation VIII; and briefly describe impacts, if any, to historic properties that have occurred as a result of implementation of this PA. DOE and the Consulting Parties shall respond to Clean Line with comments, objections, or concerns on the draft Close-Out Report or the draft summary of the Close-Out Report no later than 45 calendar days after receipt, and Clean Line shall take those comments, objections, and concerns into account when finalizing the Close-Out Report and the summary of the Close-Out Report. Failure by DOE or the Consulting Parties to respond no later than 45 calendar days after receipt shall not preclude Clean Line from finalizing the Close-Out Report and the summary of the Close-Out Report. If DOE or a Consulting Party objects to all or part of the Close-Out Report or the summary of the Close-Out Report, DOE shall consult with the objecting party or parties and Clean Line to resolve the objection(s) within 20 calendar days. If the parties have not resolved the objection within 20 calendar days, DOE will consider the concerns expressed by the Consulting Parties, render a decision on whether and how to modify the Close-Out Report or the summary of the Close-Out Report, and notify the Consulting Parties of that decision no more than 14 calendar days after the 20-calendar-day period ends. Clean Line shall submit the final Close-Out Report to DOE, the Signatories, and the Invited Signatories, and the final summary of the Close-Out Report to the Consulting Parties. No later than 15 calendar days after receipt of the final Close-Out Report, DOE shall notify Clean Line with any remaining comments on the Close-Out Report.

XII. Dispute Resolution

For all disputes regarding this PA except Stipulations V.D, XI.A, and XI.D, the following will apply:

A. Objections

If any Signatory or Invited Signatory to this PA objects in writing to DOE regarding any action carried out or proposed with respect to this PA or to implementation of this PA, DOE will consult with the objecting Signatory or Invited Signatory, with notification to the Consulting Parties, to resolve the objection. Within 30 calendar days of receiving notice of the objection from DOE, any other Consulting Party may respond in writing to the objection, with a copy to all Consulting Parties.

B. Objection Resolution

After initiating such consultation and reviewing any responses to the objection, DOE shall determine within 30 calendar days whether the objection can be resolved through consultation. If DOE determines that the objection cannot be resolved through consultation, it shall take the following steps:

1. DOE shall forward all documentation relevant to the dispute, including DOE's proposed resolution, to the ACHP. The ACHP will have the opportunity to provide DOE with its advice on the resolution of the objection within 30 calendar days of receiving adequate documentation. DOE shall make a decision on the dispute within 30 calendar days after receiving advice from ACHP.

2. DOE's final decision on the dispute will be in writing and will include a written response that takes into account any timely advice or comments regarding the dispute from the ACHP and Consulting Parties, and DOE shall provide a copy of this written response to all Consulting Parties, including the ACHP.

3. Implementation of this PA will then proceed according to DOE's final decision.

C. Public Objections

If an objection pertaining to this PA is raised by a member of the public at any time during implementation of the stipulations contained in this PA, DOE shall notify the Consulting Parties and take the objection into account, and consult with Signatories and Invited Signatories to resolve the objection if DOE decides that such consultation is appropriate.

D. Timeline

If the ACHP does not provide its advice regarding the dispute within 30 calendar days, DOE may make a final decision on the dispute and proceed accordingly. DOE's final decision on the dispute will be in writing and include a written response that takes into account any timely comments regarding the dispute from the Signatories and Invited Signatories. DOE shall provide a copy of such written response to all Consulting Parties, including the ACHP.

E. Responsibilities

The responsibilities of each Signatory and Invited Signatory to carry out all other actions according to the terms of this PA that are not subject of the dispute remain unchanged.

F. Objection Resolution Requiring Amendment

Any resolution of an objection requiring changes to this PA will follow the amendment procedure at Stipulation XIV.

G. Objections concerning Eligibility for the NRHP

Notwithstanding the above, any objections or disputes concerning eligibility of properties for the NRHP will be resolved by the Keeper of the NRHP in accordance with 36 CFR Part 63.

XIII. Duration

Notwithstanding Stipulation XV.A, this PA will continue in full force and effect until completion of construction and restoration activities for the proposed Project or a period of seven years, whichever occurs first, unless previously terminated in accordance with Stipulation XV, or another agreement is executed for the undertaking in compliance with NHPA Section 106, which supersedes this PA. In addition, this PA will be terminated if construction on the proposed Project has not been initiated within five years from the date of execution of this PA.

At any time in the three-month period prior to the automatic termination of the PA, any Signatory or Invited Signatory to this PA may request in writing that the other Signatories, Invited Signatories, and Consulting Parties consult to consider an extension of this PA. Any extension will be considered an amendment to the PA and will be made effective according to Stipulation XIV.

XIV. Amendments

Any Signatory or Invited Signatory may propose in writing to the other Signatories or Invited Signatories that the PA be amended, whereupon the Signatories, Invited Signatories, and Consulting Parties will consult in order to consider such amendment. The amendment will be effective on the date a copy signed by the Signatories and Invited Signatories, who have signed this PA prior to the proposed amendment, is filed with the ACHP.

XV. Withdrawal and Termination

A. Withdrawal

1. Any Signatory or Invited Signatory to this PA may withdraw from this PA after first providing the other Signatories and Invited Signatories written notice that explains the reasons for withdrawal and providing them an opportunity to consult regarding amendment of the PA to prevent withdrawal. Withdrawal from this PA by a Signatory or Invited Signatory will require DOE to comply with 36 CFR Part 800 Subpart B with respect to the withdrawing Signatory in lieu of this PA.

2. Withdrawal from this PA by a SHPO will require DOE to comply with 36 CFR Part 800 Subpart B with respect to all undertakings on or affecting lands under the jurisdiction of that SHPO in lieu of this PA. In this instance, the ACHP will be notified by DOE and ACHP will determine whether ACHP will act on behalf of the withdrawing SHPO.

3. This PA shall remain in full force and effect with regard to all non-withdrawing parties.

B. Termination

1. If any Signatory or Invited Signatory to this PA determines that the terms of this Agreement will not or cannot be carried out, that party shall immediately consult with the other parties and make a good faith effort to develop an amendment per

Stipulation XIV. If within 30 calendar days an amendment cannot be reached (or such longer period as is agreed to by the Signatories and Invited Signatories), any Signatory or Invited Signatory may terminate the PA upon written notification to the other Signatories and Invited Signatories.

2. In the event this PA is terminated, and to the extent feasible prior to continuing to implement the undertaking, DOE must either (a) execute a new agreement pursuant to 36 CFR §800.14(b)(3), (b) revert to and proceed at the appropriate point of the phased process for identification and evaluation directly under 36 CFR §§800.4, 800.5, and 800.6, or (c) if identification and evaluation are complete, request, take into account, and respond to the comments of the ACHP under 36 CFR §800.7.

XVI. Anti-Deficiency Act and Funding

Should DOE decide to participate in the proposed Project, DOE's obligations under this PA are subject to the availability of appropriated funds, and the stipulations of this PA are subject to the provisions of the Anti-Deficiency Act. DOE shall implement the stipulations set forth in this PA through a separate funding agreement, as appropriate. DOE will make reasonable and good faith efforts to secure the necessary funds to implement this PA in its entirety. If compliance with the Anti-Deficiency Act alters or impairs DOE's ability to implement the stipulations of this agreement, DOE will consult in accordance with the amendment and terminations procedures found at Stipulations XIV and XV.B of this agreement.

XVII. DOE, Federal Agencies, and DOE's Undertaking

A. DOE Participation

Should DOE decide to participate in the proposed Project, DOE shall condition its participation on Clean Line's compliance with the terms of this PA, or the provisions of 36 CFR 800 Subpart B, if this PA is terminated. This condition on DOE's participation may be implemented by means of the decision document issued pursuant to the National Environmental Policy Act (i.e., the Record of Decision) or other relevant, subsequent agreement(s) between DOE and Clean Line concerning the undertaking.

B. DOE Withdrawal

At any time after the Effective Date of this PA, if DOE decides not to participate in the proposed Project, the remaining Signatories and Clean Line will maintain the option to terminate or amend to continue the PA with respect to all or part of the proposed Project if a Federal agency that is a Signatory would still consider issuing permits or authorizations that constitute an undertaking for the Project.

C. Addition of Federal Agencies in the Future

At any time after the Effective Date of this PA, should a Federal agency that did not participate in DOE's Section 106 consultation that resulted in this PA determine that it has an undertaking related to the proposed Project, such Federal agency may become a Signatory to this PA, through the amendment process set forth in stipulation XIV above, and implement its terms to evidence its compliance with Section 106.

D. Addition of Indian Tribe or Nation in the Future

At any time after the Effective Date of this PA, an Indian Tribe or Nation, which attaches religious and cultural significance to historic properties that may be affected by the undertaking and which did not participate in consultation to develop this PA, may request of DOE to join this PA, through the amendment process set forth in stipulation XIV above, and implement its terms to evidence its compliance with Section 106.

XVIII. General Provisions and Scope of Agreement

1. This PA is neither intended nor shall be construed to diminish or affect in any way the right of any consulting Tribe or Nation to take any lawful action to protect Native American graves from disturbance or desecration, to protect archaeological sites from damage, or to protect the consulting Tribe or Nation's rights under cemetery and Native American graves protection laws or other applicable laws.

2. This PA in no way restricts any Signatory or Invited Signatory from participating in any activity with other public or private agencies, organizations, or individuals, except as provided for in Stipulation III of this PA. This PA will be subject to, and will be carried out in compliance with, all applicable laws, regulations, and other legal requirements.

3. Sovereign Immunity: No Federal, State, or Tribal government waives sovereign or governmental immunity by entering into this PA, and all retain immunities and defenses provided by law with respect to any action based on or occurring as a result of the PA.

4. Severability: Should any portion of this PA be judicially determined by a court established by Article III of the U.S. Constitution to be illegal or unenforceable, the remainder of the PA shall continue in full force and effect, and any Signatory or Invited Signatory may initiate consultation with the other Signatories and Invited Signatories to consider the renegotiation of the term(s) affected by the severance in accordance with Stipulation XIV, Amendments.

5. Assumption of Risk of Liability: Each Signatory and Invited Signatory to this PA assumes the risk of any liability arising from its own conduct. Each Signatory and Invited Signatory agrees they are not obligated to insure, defend, or indemnify any other Signatory or Invited Signatory to this PA. Nothing in this stipulation modifies any person's ability under the Administrative Procedure Act or the National Historic Preservation Act to bring an action or suit related to this undertaking or this agreement.

XIX. Execution of Agreement

A. Signatures and Effective Date

This PA shall be effective on the date of the signature of the last Signatory ("Effective Date"). All other parties listed below as Invited Signatories shall only become parties to this Agreement upon their execution thereof. Any Invited Signatory listed below who does not execute this Agreement shall have no further rights or obligations pursuant to this Agreement but shall continue to be considered as a Consulting Party. DOE will ensure that each Signatory and Invited Signatory is provided with a copy of the fully executed PA.

B. Execution

Execution of this PA by DOE, ACHP, Tribes or Nations, and SHPOs will be considered to be an agreement pursuant to 36 CFR §800.6(c) and demonstrates compliance with Section 101(d)(6)(B) of the NHPA (54 USC §302706[b]) as regards consultation with Indian tribes that attach religious and cultural significance to historic properties that may be affected by the proposed undertaking. Execution and implementation of the terms of this PA demonstrate that DOE, TVA, and BIA have afforded the ACHP an opportunity to comment on the proposed undertaking and its effect on historic properties and that DOE, TVA, and BIA have taken into account the effect of the undertaking on historic properties in accordance with Section 106 of the NHPA, 54 USC §306108.

XX. Appendices

Appendices (in addition to those described in the PA above):

A. Consulting Tribes or Nations' areas of interest by map or by county
B. List of municipalities and counties contacted
C. List of Consulting Parties
D. Points of Contact Lists
E. Historic Properties Identification Plan
F. Historic Properties Treatment Plan

SIGNATORIES

PROGRAMMATIC AGREEMENT

AMONG THE

**U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION**

**REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE
TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES**

**UNITED STATES DEPARTMENT OF ENERGY
OFFICE OF ELECTRICITY DELIVERY AND ENERGY RELIABILITY**

By: ______________________________ Date: ____________________

Patricia A. Hoffman/Assistant Secretary

PROGRAMMATIC AGREEMENT

AMONG THE

**U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION**

REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES

**UNITED STATES DEPARTMENT OF ENERGY
SOUTHWESTERN POWER ADMINISTRATION**

By: ______________________________ Date: ____________________

[TBD]/Administrator

PROGRAMMATIC AGREEMENT

AMONG THE

**U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION**

**REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE
TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES**

ADVISORY COUNCIL ON HISTORIC PRESERVATION

By: ______________________________ Date: ____________________

Name/Position:

PROGRAMMATIC AGREEMENT

AMONG THE

U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION

REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES

TENNESSEE VALLEY AUTHORITY

By: ______________________________ Date: ____________________

Name/Position:

PROGRAMMATIC AGREEMENT

AMONG THE

**U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION**

**REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE
TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES**

U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS, EASTERN OKLAHOMA REGION

By: ______________________________ Date: ____________________

Name/Position:

PROGRAMMATIC AGREEMENT

AMONG THE

U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION

REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES

OKLAHOMA STATE HISTORIC PRESERVATION OFFICE

By: ______________________________________ Date: ____________________

Dr. Bob L. Blackburn/State Historic Preservation Officer

PROGRAMMATIC AGREEMENT

AMONG THE

**U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION**

REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES

OKLAHOMA ARCHAEOLOGICAL SURVEY

By: ______________________________ Date: ________________

Dr. Robert L. Brooks/State Archaeologist

PROGRAMMATIC AGREEMENT

AMONG THE

**U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION**

**REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE
TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES**

ARKANSAS STATE HISTORIC PRESERVATION OFFICE

By: ______________________________ Date: ____________________

Stacy Hurst/State Historic Preservation Officer

PROGRAMMATIC AGREEMENT

AMONG THE

**U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION**

**REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE
TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES**

TENNESSEE STATE HISTORIC PRESERVATION OFFICE

By: ______________________________ Date: ____________________

Name/Position:

PROGRAMMATIC AGREEMENT

AMONG THE

U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION

REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES

TEXAS STATE HISTORIC PRESERVATION OFFICE

By: ______________________________ Date: ____________________

Name/Position:

PROGRAMMATIC AGREEMENT

AMONG THE

**U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION**

**REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE
TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES**

CHEROKEE NATION

By: ____ Date: ____________________

Name/Position:

INVITED SIGNATORIES

PROGRAMMATIC AGREEMENT

AMONG THE

**U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION**

**REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE
TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES**

ABSENTEE-SHAWNEE TRIBE OF INDIANS OF OKLAHOMA

By: ______________________________ Date: ____________________

Name/Position:

PROGRAMMATIC AGREEMENT

AMONG THE

U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION

REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES

CHICKASAW NATION

Nothing contained in this Agreement shall be construed to waive the sovereign rights of the Chickasaw Nation, its officers, employees or agents.

By: ____ Date: ____________________

Name/Position:

PROGRAMMATIC AGREEMENT

AMONG THE

U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION

REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES

CHOCTAW NATION OF OKLAHOMA

By: ______________________________ Date: ____________________

Gary Batton/Chief

PROGRAMMATIC AGREEMENT

AMONG THE

**U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION**

**REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE
TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES**

IOWA TRIBE OF OKLAHOMA

By: ______________________________ Date: ____________________

Name/Position:

PROGRAMMATIC AGREEMENT

AMONG THE

U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION

REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES

MUSCOGEE (CREEK) NATION

By: ______________________________ Date: ____________________

George Tiger/Principal Chief

PROGRAMMATIC AGREEMENT

AMONG THE

**U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION**

**REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE
TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES**

OSAGE NATION

By: ______________________________ Date: ____________________

Geoffrey M. Standing Bear/Principal Chief

PROGRAMMATIC AGREEMENT

AMONG THE

**U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION**

**REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE
TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES**

QUAPAW TRIBE OF OKLAHOMA

By: ______________________________ Date: ____________________

Name/Position:

PROGRAMMATIC AGREEMENT

AMONG THE

**U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION**

**REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE
TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES**

SAC AND FOX NATION

By: ______________________________ Date: ____________________

Name/Position:

PROGRAMMATIC AGREEMENT

AMONG THE

**U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION**

**REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE
TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES**

THLOPTHLOCCO TRIBAL TOWN

By: ____ Date: ____________________

George Scott/Town King

PROGRAMMATIC AGREEMENT

AMONG THE

**U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION**

REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES

UNITED KEETOOWAH BAND OF CHEROKEE INDIANS IN OKLAHOMA

By: ______________________________ Date: ____________________

Name/Position:

PROGRAMMATIC AGREEMENT

AMONG THE

**U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION**

**REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE
TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES**

WICHITA AND AFFILIATED TRIBES

By: ______________________________ Date: ____________________

Name/Position:

PROGRAMMATIC AGREEMENT

AMONG THE

**U.S. DEPARTMENT OF ENERGY,
SOUTHWESTERN POWER ADMINISTRATION,
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
TENNESSEE VALLEY AUTHORITY,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
EASTERN OKLAHOMA REGION
OKLAHOMA STATE HISTORIC PRESERVATION OFFICE,
OKLAHOMA ARCHAEOLOGICAL SURVEY,
ARKANSAS STATE HISTORIC PRESERVATION OFFICE,
TENNESSEE STATE HISTORIC PRESERVATION OFFICE,
TEXAS STATE HISTORIC PRESERVATION OFFICE,
AND
CHEROKEE NATION**

**REGARDING THE PROPOSED PLAINS AND EASTERN CLEAN LINE
TRANSMISSION PROJECT PLANNING AND CONSTRUCTION PHASES**

PLAINS AND EASTERN CLEAN LINE LLC AND PLAINS AND EASTERN CLEAN LINE OKLAHOMA LLC

By: ____________________________ Date: ____________________

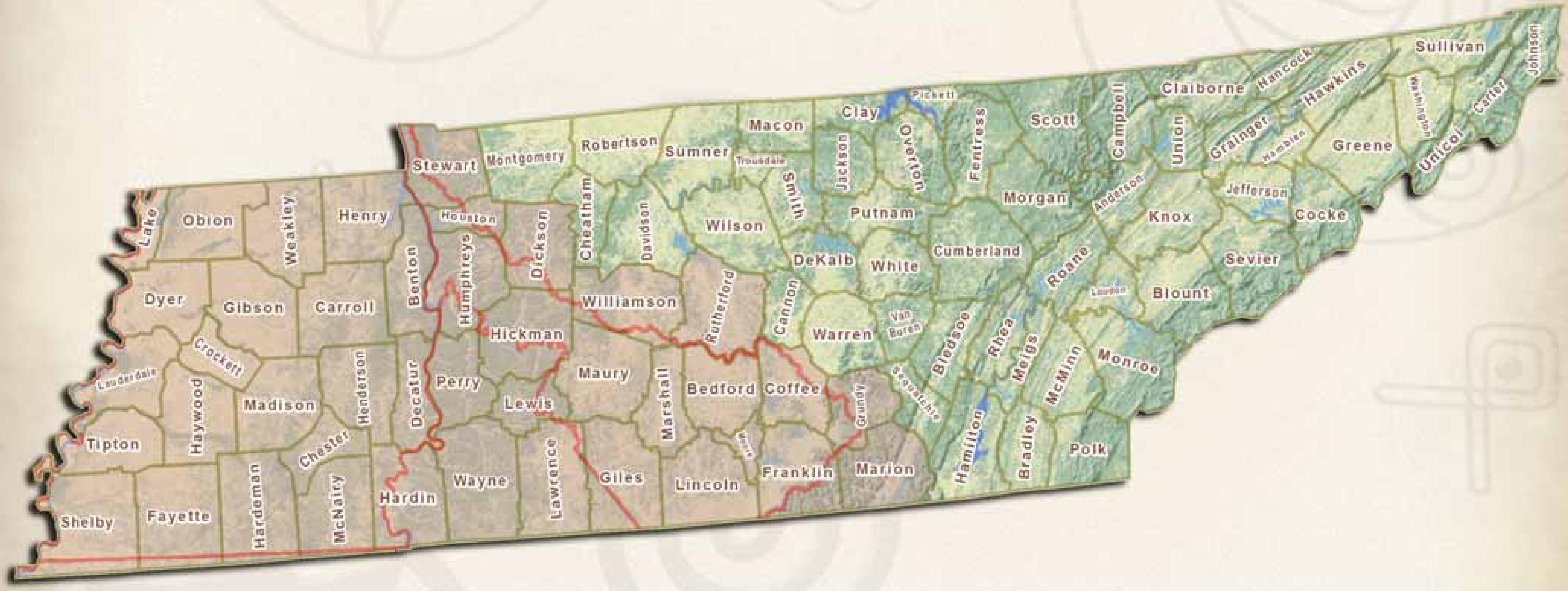
Name/Position:

Appendix A:

CONSULTING TRIBES OR NATIONS' AREAS OF INTEREST BY MAP OR BY COUNTY

TENNESSEE

with Chickasaw Areas of Interest



Legend

County of Interest

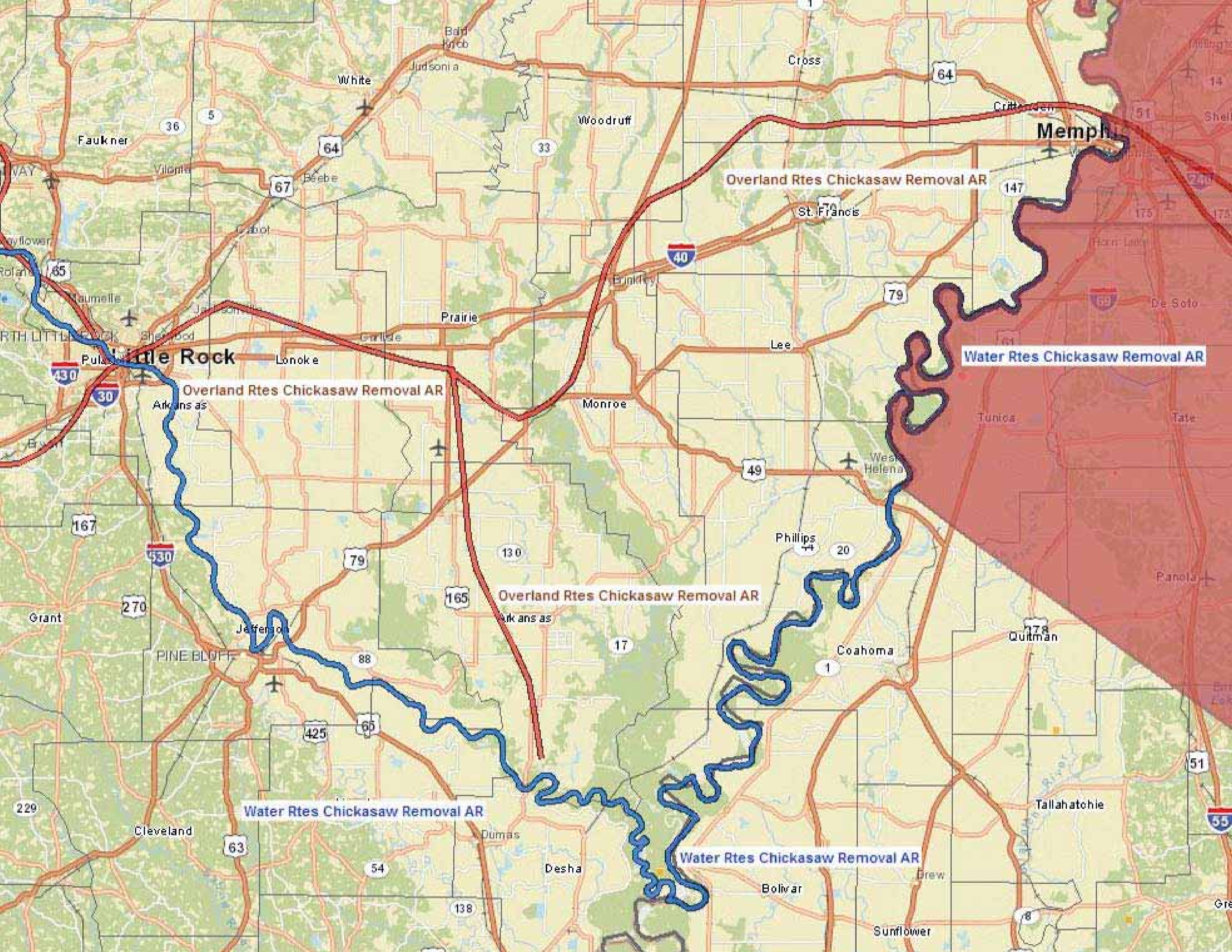
0 25 50 75 100
Miles

North_America_Albers_Equal_Area_Conic
Projection: Albers
Linear Unit: Meter

GCS North American 1983
Datum: D North American 1983

Note: This map is a representation and may be INCOMPLETE. It does not portray exact area, location or boundary, which an accurate survey may disclose.
Map By: The Chickasaw Nation / Construction & Support / GeoSpatial Information / Corey Gillum
CNGIS_3747 03/20/2014

GeoSpatial Information
Chickasaw Nation Division of Construction & Support Services


Overland Rtes Chickasaw Removal AR
Overland Rtes Chickasaw Removal AR
Overland Rtes Chickasaw Removal AR
Water Rtes Chickasaw Removal AR
Water Rtes Chickasaw Removal AR
Water Rtes Chickasaw Removal AR
Little Rock
Memphis
White
Woodruff
Cross
Faulkner
Lonoke
Prairie
Monroe
Lee
St. Francis
Arkansas
Jefferson
Pine Bluff
Phillips
Desha
Grant
Cleveland
Coahoma
Bolivar
Sunflower
Tallahatchie
Quitman
Tunica
Tate
Panola
De Soto
Dumas
Cabot
Beebe
Judsonia
Brinkley
West Helena


River Rtes Chickasaw Removal AR
Overland Rtes Chickasaw Removal AR
River Rtes Chickasaw Removal AR
Overland Rtes Chickasaw Removal AR
Sequoyah
Crawford
Johnson
Van Buren
Franklin
Pope
Conway
FORT SMITH
Muldrow
Robert S Kerr Reservoir
Lake Dardanelle
Atkins
Sebastian
Logan
Yell
Perry
Mayflower
Lake Maumelle
NORTH LITTLE
Le Flore
Lake Wister
Scott
Saline
Arkansas
Lake Ouachita
Garland
Montgomery
Polk
Hot Spring
Amity
De Gray Lake
Lake Greeson
Pike
McCurtain
Broken Bow
Howard
Sevier
Clark
Curtis
Gurdon
Dallas
Mineral Springs
Oklahoma
Arkansas

From: Ardis, Melissa <Melissa.Ardis@go.doe.gov>
Sent: Wednesday, April 24, 2013 1:20 PM
To: Summerson, Jane; 'jastover@jason.com'; 'John MacDonald'
Subject: FW: DOE, Plains and Eastern Clean Line Project EIS - Tribal Consultation

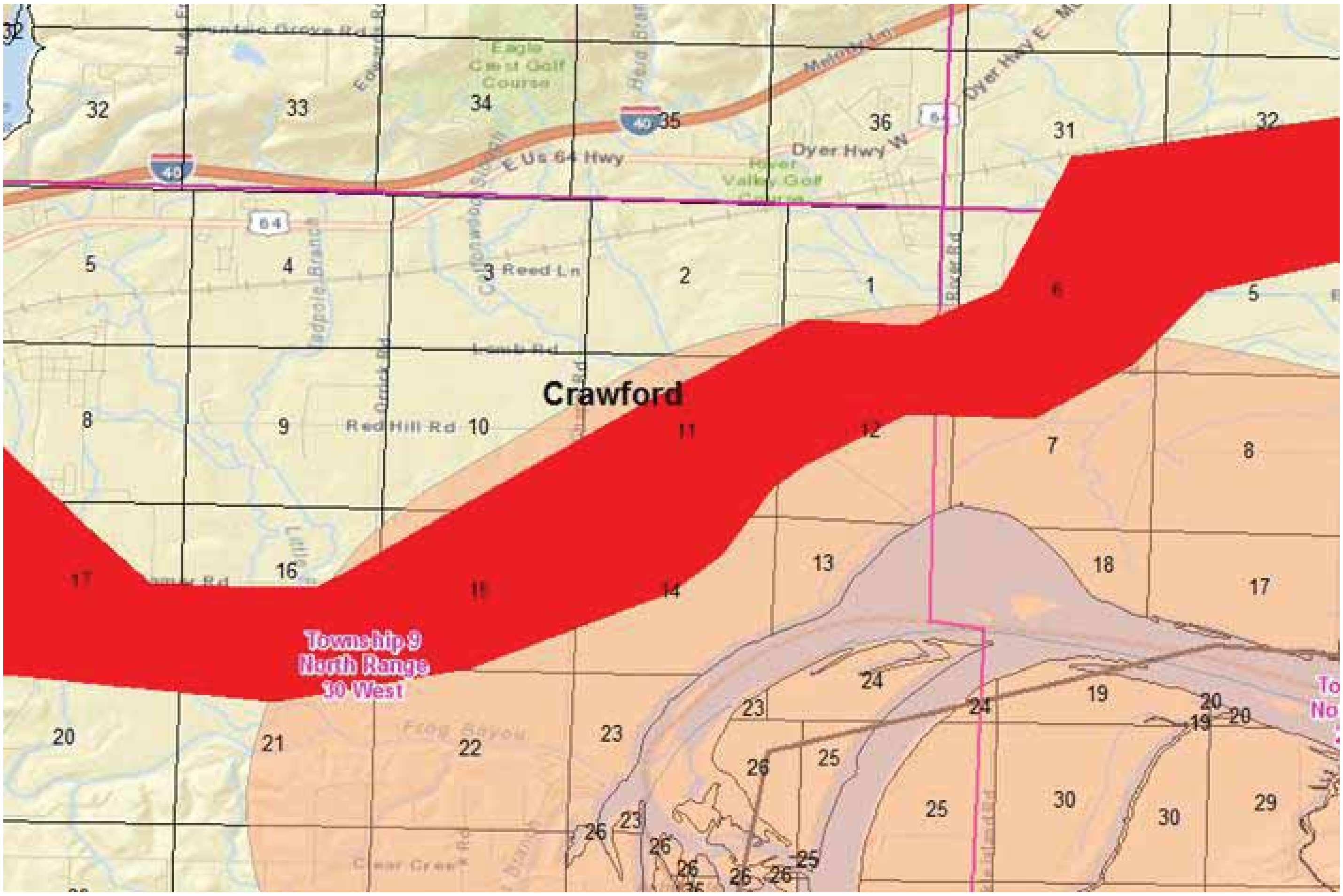
I don't think I forwarded this one earlier.

Melissa Ardis
Office: 720-356-1566
Blackberry: 720-291-1602
melissa.ardis@go.doe.gov

From: Johnnie L. Jacobs [mailto:jjacobs@choctawnation.com]
Sent: Monday, April 15, 2013 9:34 AM
To: Ardis, Melissa
Cc: Lindsey D. Huffman
Subject: RE: DOE, Plains and Eastern Clean Line Project EIS - Tribal Consultation

Dear Ms. Ardis,

Thank you for sending the consultation information and project shapefile regarding the above referenced project. We have reviewed the currently proposed project location. Again, we do not have any areas of historic interest in the Oklahoma portion of the project. While we do have portions of Shelby County, TN that are within our area of interest, the area of ground disturbance in Shelby County (as currently proposed) is outside our area. However, in Crawford County, AR, the project line enters and area where there could be possible Choctaw sites or graves due to the Tribes removal route through this area from Mississippi to Oklahoma in the 1800s. It is within this area that we would like to consult and have some involvement in the PA. Because we may not be able to participate in face to face meetings, we would be glad to be involved in teleconferences as well as updates on work done in this area. I have included an image of the area within Crawford County that we have our concern. The peach area is our area of interest and the red area is the project line. If you have any further questions, please let me know.



Thank you,

Ms. Johnnie Jacobs
NHPA Section 106 Coordinator
Choctaw Nation of Oklahoma
Historic Preservation Department
P.O. Box 1210
Durant, OK 74701
jjacobs@choctawnation.com

From: Ardis, Melissa [mailto:Melissa.Ardis@go.doe.gov]
Sent: Thursday, April 04, 2013 12:34 PM
To: Johnnie L. Jacobs
Subject: RE: DOE, Plains and Eastern Clean Line Project EIS - Tribal Consultation

Ms. Jacobs –

My full mailing address is:

1617 Cole Blvd.
Golden, CO 80401

QUAPAW TRIBE OF OKLAHOMA
Ancestral & Historic Territory by State and County/Parish

Arkansas:

Arkansas ^
Ashley ^
Baxter ^
Boone
Bradley ^
Calhoun ^
Carroll
Chicot ^
Clark ^
Clay
Cleburne ^
Cleveland ^
Columbia ^
Conway ^
Craighead
Crawford ^
Crittenden
Cross
Dallas ^
Desha ^
Drew ^
Faulkner ^
Franklin ^
Fulton
Garland ^
Grant ^
Greene
Hempstead^
Hot Spring ^
Howard ^
Jackson
Jefferson ^
Johnson
Independence ^
Izard
Lafayette ^
Lawrence
Lee ^
Lincoln ^
Little River ^
Logan ^
Lonoke ^
Marion ^
Mississippi
Monroe ^
Montgomery^

Arkansas:

Nevada ^
Newton
Ouachita ^
Perry ^
Phillips ^
Pike ^
Poinsett
Polk ^
Pope
Prairie ^
Pulaski ^
Randolph
Saline ^
Scott ^
Searcy ^
Sebastian^
Sevier ^
Sharp
St. Francis ^
Stone ^
Union ^
Van Buren ^
White ^
Woodruff ^
Yell ^

Louisiana:

Bossier ^
Caddo
Claiborne ^
Desoto
East Carroll ^
Lincoln ^
Madison ^
Morsehouse ^
Ouachita ^
Red River
Richland ^
Union ^
Webster ^
West Carroll ^

Mississippi:

Bolivar ^
Coahoma ^
Desoto
Hinds ^
Humphreys ^
Issaquena ^
Leflore ^
Panola
Quitman ^
Sharkey ^
Sunflower ^
Tallahatchie^
Tate
Tunica
Warren ^
Washington ^
Yazoo ^

Kentucky:

Ballard
Caldwell
Carlisle
Crittenden
Fulton
Graves
Henderson
Hickman
Livingston
Lyon
Marshall
McCracken
Trigg
Union
Webster

Tennessee:

Dyer
Fayette
Lake
Lauderdale
Obion
Shelby
Tipton

Illinois:

Alexander
Gallatin
Hardin
Jackson
Johnson
Madison
Massac
Monroe
Pope
Pulaski
Randolph
Saline
St. Clair
Union
White

Indiana

Posey
Vandenburgh
Warrick

Missouri:

Bollinger
Butler
Carter
Dunklin
Cape Giradeau
Howell
Iron
Jefferson
Madison
Mississippi
New Madrid
Oregon
Ozark
Pemiscot
Perry
Reynolds
Ripley
Scott
Shannon
St. Charles
St. Francois
St. Genevieve
St. Louis
St. Louis City
Stoddard
Wayne

Oklahoma:

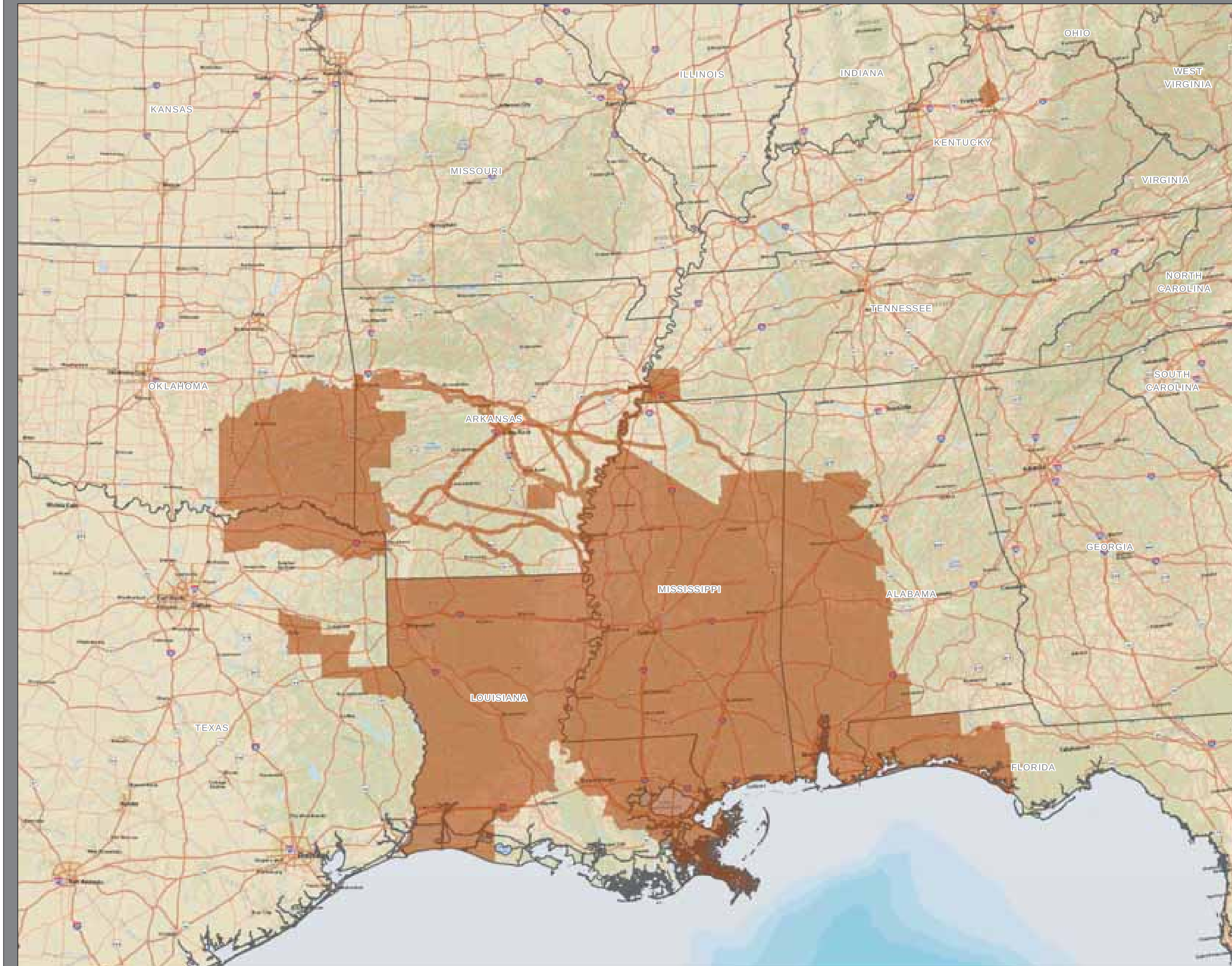
Atoka^
Beckham^
Bryan ^
Caddo^
Carter^
Choctaw^
Coal^
Comanche^
Cotton^
Custer^
Dewey^
Garvin^
Grady^
Greer^
Harmon^
Haskell^
Hughes^
Jackson^
Jefferson^
Johnston^
Kiowa^
Latimer^
LeFlore^
Love^
Marshall^
McClain^
McCurtain^
Murray^
Ottawa ^^
Osage^
Pittsburg ^
Pontotoc^
Pushmahata^
Roger Mills^
Stephens^
Tillman^
Washita^

Kansas:

Cherokee^^

^ Treaty lands of 1818, 1824
^^ Treaty lands of 1835

Choctaw Nation of Oklahoma's Area of Historic Interest



Legend

Area of Interest

*Data provided by the Choctaw Nation of Oklahoma on January 19, 2015

0 30 60 120 Miles

Scale is 1:2,500,000 when printed at 22x34"

Chavez, Allie

Subject: RE: Plains and Eastern Clean Line Transmission Line Project - Draft Final Programmatic Agreement Appendices

-----Original Message-----
From: Lisa LaRue-Baker - UKB THPO [mailto:ukbthpo-larue@yahoo.com]
Sent: Wednesday, August 19, 2015 2:36 PM
To: Farmer, Constance <Connie.Farmer@tetratech.com>
Cc: ebird@unitedkeetoowahband.org
Subject: Re: Plains and Eastern Clean Line Transmission Line Project - Draft Final Programmatic Agreement Appendices

In Appendix A, my title needs to be shown as Acting THPO.

For the Appendix which shows tribal areas of historic interest, our are listed below so you can determine which portions of the APE to consult with us on, as I didn't see our tribe listed in that section.

ALABAMA, AUTAUGA County
ALABAMA, BALDWIN County
ALABAMA, BARBOUR County
ALABAMA, BIBB County
ALABAMA, BLOUNT County
ALABAMA, BULLOCK County
ALABAMA, BUTLER County
ALABAMA, CALHOUN County
ALABAMA, CHAMBERS County
ALABAMA, CHEROKEE County
ALABAMA, CHILTON County
ALABAMA, CHOCTAW County
ALABAMA, CLARKE County
ALABAMA, CLAY County
ALABAMA, CLEBURNE County
ALABAMA, COFFEE County
ALABAMA, COLBERT County
ALABAMA, CONECUH County
ALABAMA, COOSA County
ALABAMA, COVINGTON County
ALABAMA, CRENSHAW County
ALABAMA, CULLMAN County
ALABAMA, DALE County
ALABAMA, DALLAS County
ALABAMA, DEKALB County
ALABAMA, ELMORE County
ALABAMA, ESCAMBIA County
ALABAMA, ETOWAH County
ALABAMA, FAYETTE County
ALABAMA, FRANKLIN County
ALABAMA, GENEVA County
ALABAMA, GREENE County

ALABAMA, HALE County
ALABAMA, HENRY County
ALABAMA, HOUSTON County
ALABAMA, JACKSON County
ALABAMA, JEFFERSON County
ALABAMA, LAMAR County
ALABAMA, LAUDERDALE County
ALABAMA, LAWRENCE County
ALABAMA, LEE County
ALABAMA, LIMESTONE County
ALABAMA, LOWNDES County
ALABAMA, MACON County
ALABAMA, MADISON County
ALABAMA, MARENGO County
ALABAMA, MARION County
ALABAMA, MARSHALL County
ALABAMA, MOBILE County
ALABAMA, MONROE County
ALABAMA, MONTGOMERY County
ALABAMA, MORGAN County
ALABAMA, PERRY County
ALABAMA, PICKENS County
ALABAMA, PIKE County
ALABAMA, RANDOLPH County
ALABAMA, RUSSELL County
ALABAMA, ST. CLAIR County
ALABAMA, SHELBY County
ALABAMA, SUMTER County
ALABAMA, TALLADEGA County
ALABAMA, TALLAPOOSA County
ALABAMA, TUSCALOOSA County
ALABAMA, WALKER County
ALABAMA, WASHINGTON County
ALABAMA, WILCOX County
ALABAMA, WINSTON County
ARKANSAS, ARKANSAS County
ARKANSAS, BAXTER County
ARKANSAS, BENTON County
ARKANSAS, CLEBURNE County
ARKANSAS, CONWAY County
ARKANSAS, CRAWFORD County
ARKANSAS, CRITTENDEN County
ARKANSAS, CROSS County
ARKANSAS, DESHA County
ARKANSAS, FAULKNER County
ARKANSAS, FRANKLIN County
ARKANSAS, JOHNSON County
ARKANSAS, LEE County
ARKANSAS, LINCOLN County
ARKANSAS, LOGAN County
ARKANSAS, LONOKE County
ARKANSAS, MARION County

ARKANSAS, MONROE County
ARKANSAS, NEWTON County
ARKANSAS, PERRY County
ARKANSAS, PHILLIPS County
ARKANSAS, PIKE County
ARKANSAS, POPE County
ARKANSAS, PRAIRIE County
ARKANSAS, PULASKI County
ARKANSAS, ST. FRANCIS County
ARKANSAS, SCOTT County
ARKANSAS, SEARCY County
ARKANSAS, SEBASTIAN County
ARKANSAS, STONE County
ARKANSAS, VAN BUREN County
ARKANSAS, WHITE County
ARKANSAS, WOODRUFF County
ARKANSAS, YELL County
GEORGIA, APPLING County
GEORGIA, ATKINSON County
GEORGIA, BACON County
GEORGIA, BAKER County
GEORGIA, BALDWIN County
GEORGIA, BANKS County
GEORGIA, BARROW County
GEORGIA, BARTOW County
GEORGIA, BEN HILL County
GEORGIA, BERRIEN County
GEORGIA, BIBB County
GEORGIA, BLECKLEY County
GEORGIA, BRANTLEY County
GEORGIA, BROOKS County
GEORGIA, BRYAN County
GEORGIA, BULLOCH County
GEORGIA, BURKE County
GEORGIA, BUTTS County
GEORGIA, CALHOUN County
GEORGIA, CAMDEN County
GEORGIA, CANDLER County
GEORGIA, CARROLL County
GEORGIA, CATOOSA County
GEORGIA, CHARLTON County
GEORGIA, CHATHAM County
GEORGIA, CHATTAHOOCHEE County
GEORGIA, CHATTOOGA County
GEORGIA, CHEROKEE County
GEORGIA, CLARKE County
GEORGIA, CLAY County
GEORGIA, CLAYTON County
GEORGIA, CLINCH County
GEORGIA, COBB County
GEORGIA, COFFEE County
GEORGIA, COLQUITT County

GEORGIA, COLUMBIA County
GEORGIA, COOK County
GEORGIA, COWETA County
GEORGIA, CRAWFORD County
GEORGIA, CRISP County
GEORGIA, DADE County
GEORGIA, DAWSON County
GEORGIA, DECATUR County
GEORGIA, DEKALB County
GEORGIA, DODGE County
GEORGIA, DOOLY County
GEORGIA, DOUGHERTY County
GEORGIA, DOUGLAS County
GEORGIA, EARLY County
GEORGIA, ECHOLS County
GEORGIA, EFFINGHAM County
GEORGIA, ELBERT County
GEORGIA, EMANUEL County
GEORGIA, EVANS County
GEORGIA, FANNIN County
GEORGIA, FAYETTE County
GEORGIA, FLOYD County
GEORGIA, FORSYTH County
GEORGIA, FRANKLIN County
GEORGIA, FULTON County
GEORGIA, GILMER County
GEORGIA, GLASCOCK County
GEORGIA, GLYNN County
GEORGIA, GORDON County
GEORGIA, GRADY County
GEORGIA, GREENE County
GEORGIA, GWINNETT County
GEORGIA, HABERSHAM County
GEORGIA, HALL County
GEORGIA, HANCOCK County
GEORGIA, HARALSON County
GEORGIA, HARRIS County
GEORGIA, HART County
GEORGIA, HEARD County
GEORGIA, HENRY County
GEORGIA, HOUSTON County
GEORGIA, IRWIN County
GEORGIA, JACKSON County
GEORGIA, JASPER County
GEORGIA, JEFF DAVIS County
GEORGIA, JEFFERSON County
GEORGIA, JENKINS County
GEORGIA, JOHNSON County
GEORGIA, JONES County
GEORGIA, LAMAR County
GEORGIA, LANIER County
GEORGIA, LAURENS County

GEORGIA, LEE County
GEORGIA, LIBERTY County
GEORGIA, LINCOLN County
GEORGIA, LONG County
GEORGIA, LOWNDES County
GEORGIA, LUMPKIN County
GEORGIA, MCDUFFIE County
GEORGIA, MCINTOSH County
GEORGIA, MACON County
GEORGIA, MADISON County
GEORGIA, MARION County
GEORGIA, MERIWETHER County
GEORGIA, MILLER County
GEORGIA, MITCHELL County
GEORGIA, MONROE County
GEORGIA, MONTGOMERY County
GEORGIA, MORGAN County
GEORGIA, MURRAY County
GEORGIA, MUSCOGEE County
GEORGIA, NEWTON County
GEORGIA, OCONEE County
GEORGIA, OGLETHORPE County
GEORGIA, PAULDING County
GEORGIA, PEACH County
GEORGIA, PICKENS County
GEORGIA, PIERCE County
GEORGIA, PIKE County
GEORGIA, POLK County
GEORGIA, PULASKI County
GEORGIA, PUTNAM County
GEORGIA, QUITMAN County
GEORGIA, RABUN County
GEORGIA, RANDOLPH County
GEORGIA, RICHMOND County
GEORGIA, ROCKDALE County
GEORGIA, SCHLEY County
GEORGIA, SCREVEN County
GEORGIA, SEMINOLE County
GEORGIA, SPALDING County
GEORGIA, STEPHENS County
GEORGIA, STEWART County
GEORGIA, SUMTER County
GEORGIA, TALBOT County
GEORGIA, TALIAFERRO County
GEORGIA, TATTNALL County
GEORGIA, TAYLOR County
GEORGIA, TELFAIR County
GEORGIA, TERRELL County
GEORGIA, THOMAS County
GEORGIA, TIFT County
GEORGIA, TOOMBS County
GEORGIA, TOWNS County

GEORGIA, TREUTLEN County
GEORGIA, TROUP County
GEORGIA, TURNER County
GEORGIA, TWIGGS County
GEORGIA, UNION County
GEORGIA, UPSON County
GEORGIA, WALKER County
GEORGIA, WALTON County
GEORGIA, WARE County
GEORGIA, WARREN County
GEORGIA, WASHINGTON County
GEORGIA, WAYNE County
GEORGIA, WEBSTER County
GEORGIA, WHEELER County
GEORGIA, WHITE County
GEORGIA, WHITFIELD County
GEORGIA, WILCOX County
GEORGIA, WILKES County
GEORGIA, WILKINSON County
GEORGIA, WORTH County
ILLINOIS, ALEXANDER County
ILLINOIS, CLAY County
ILLINOIS, CLINTON County
ILLINOIS, EDWARDS County
ILLINOIS, FRANKLIN County
ILLINOIS, GALLATIN County
ILLINOIS, HAMILTON County
ILLINOIS, HARDIN County
ILLINOIS, JACKSON County
ILLINOIS, JEFFERSON County
ILLINOIS, JOHNSON County
ILLINOIS, LAWRENCE County
ILLINOIS, MARION County
ILLINOIS, MASSAC County
ILLINOIS, MONROE County
ILLINOIS, PERRY County
ILLINOIS, POPE County
ILLINOIS, PULASKI County
ILLINOIS, RANDOLPH County
ILLINOIS, RICHLAND County
ILLINOIS, ST. CLAIR County
ILLINOIS, SALINE County
ILLINOIS, UNION County
ILLINOIS, WABASH County
ILLINOIS, WASHINGTON County
ILLINOIS, WAYNE County
ILLINOIS, WHITE County
INDIANA, CLARK County
INDIANA, CRAWFORD County
INDIANA, DAVIESS County
INDIANA, DEARBORN County
INDIANA, DUBOIS County

INDIANA, FLOYD County
INDIANA, GIBSON County
INDIANA, HARRISON County
INDIANA, JACKSON County
INDIANA, JEFFERSON County
INDIANA, JENNINGS County
INDIANA, KNOX County
INDIANA, LAWRENCE County
INDIANA, MARTIN County
INDIANA, OHIO County
INDIANA, ORANGE County
INDIANA, PERRY County
INDIANA, PIKE County
INDIANA, POSEY County
INDIANA, RIPLEY County
INDIANA, SCOTT County
INDIANA, SPENCER County
INDIANA, SWITZERLAND County
INDIANA, VANDERBURGH County
INDIANA, WARRICK County
INDIANA, WASHINGTON County
KANSAS, BARBER County
KANSAS, BOURBON County
KANSAS, CHAUTAUQUA County
KANSAS, CHEROKEE County
KANSAS, CLARK County
KANSAS, COMANCHE County
KANSAS, COWLEY County
KANSAS, CRAWFORD County
KANSAS, HARPER County
KANSAS, LABETTE County
KANSAS, LINN County
KANSAS, MEADE County
KANSAS, MONTGOMERY County
KANSAS, MORTON County
KANSAS, NEOSHO County
KANSAS, SEWARD County
KANSAS, STEVENS County
KANSAS, SUMNER County
KANSAS, WILSON County
KENTUCKY, ADAIR County
KENTUCKY, ALLEN County
KENTUCKY, ANDERSON County
KENTUCKY, BARREN County
KENTUCKY, BATH County
KENTUCKY, BELL County
KENTUCKY, BOONE County
KENTUCKY, BOURBON County
KENTUCKY, BOYD County
KENTUCKY, BOYLE County
KENTUCKY, BRACKEN County
KENTUCKY, BREATHITT County

KENTUCKY, BRECKINRIDGE County
KENTUCKY, BULLITT County
KENTUCKY, BUTLER County
KENTUCKY, CALDWELL County
KENTUCKY, CALLOWAY County
KENTUCKY, CAMPBELL County
KENTUCKY, CARROLL County
KENTUCKY, CARTER County
KENTUCKY, CASEY County
KENTUCKY, CHRISTIAN County
KENTUCKY, CLARK County
KENTUCKY, CLAY County
KENTUCKY, CLINTON County
KENTUCKY, CRITTENDEN County
KENTUCKY, CUMBERLAND County
KENTUCKY, DAVIESS County
KENTUCKY, EDMONSON County
KENTUCKY, ELLIOTT County
KENTUCKY, ESTILL County
KENTUCKY, FAYETTE County
KENTUCKY, FLEMING County
KENTUCKY, FLOYD County
KENTUCKY, FRANKLIN County
KENTUCKY, GALLATIN County
KENTUCKY, GARRARD County
KENTUCKY, GRANT County
KENTUCKY, GRAYSON County
KENTUCKY, GREEN County
KENTUCKY, GREENUP County
KENTUCKY, HANCOCK County
KENTUCKY, HARDIN County
KENTUCKY, HARLAN County
KENTUCKY, HARRISON County
KENTUCKY, HART County
KENTUCKY, HENDERSON County
KENTUCKY, HENRY County
KENTUCKY, HOPKINS County
KENTUCKY, JACKSON County
KENTUCKY, JEFFERSON County
KENTUCKY, JESSAMINE County
KENTUCKY, JOHNSON County
KENTUCKY, KENTON County
KENTUCKY, KNOTT County
KENTUCKY, KNOX County
KENTUCKY, LARUE County
KENTUCKY, LAUREL County
KENTUCKY, LAWRENCE County
KENTUCKY, LEE County
KENTUCKY, LESLIE County
KENTUCKY, LETCHER County
KENTUCKY, LEWIS County
KENTUCKY, LINCOLN County

KENTUCKY, LIVINGSTON County
KENTUCKY, LOGAN County
KENTUCKY, LYON County
KENTUCKY, MCCREARY County
KENTUCKY, MCLEAN County
KENTUCKY, MADISON County
KENTUCKY, MAGOFFIN County
KENTUCKY, MARION County
KENTUCKY, MARTIN County
KENTUCKY, MASON County
KENTUCKY, MEADE County
KENTUCKY, MENIFEE County
KENTUCKY, MERCER County
KENTUCKY, METCALFE County
KENTUCKY, MONROE County
KENTUCKY, MONTGOMERY County
KENTUCKY, MORGAN County
KENTUCKY, MUHLENBERG County
KENTUCKY, NELSON County
KENTUCKY, NICHOLAS County
KENTUCKY, OHIO County
KENTUCKY, OLDHAM County
KENTUCKY, OWEN County
KENTUCKY, OWSLEY County
KENTUCKY, PENDLETON County
KENTUCKY, PERRY County
KENTUCKY, PIKE County
KENTUCKY, POWELL County
KENTUCKY, PULASKI County
KENTUCKY, ROBERTSON County
KENTUCKY, ROCKCASTLE County
KENTUCKY, ROWAN County
KENTUCKY, RUSSELL County
KENTUCKY, SCOTT County
KENTUCKY, SHELBY County
KENTUCKY, SIMPSON County
KENTUCKY, SPENCER County
KENTUCKY, TAYLOR County
KENTUCKY, TODD County
KENTUCKY, TRIGG County
KENTUCKY, TRIMBLE County
KENTUCKY, UNION County
KENTUCKY, WARREN County
KENTUCKY, WASHINGTON County
KENTUCKY, WAYNE County
KENTUCKY, WEBSTER County
KENTUCKY, WHITLEY County
KENTUCKY, WOLFE County
KENTUCKY, WOODFORD County
LOUISIANA, BOSSIER County
LOUISIANA, CADDO County
MISSOURI, BARRY County

MISSOURI, BARTON County
MISSOURI, BOLLINGER County
MISSOURI, BUTLER County
MISSOURI, CAMDEN County
MISSOURI, CAPE GIRARDEAU County
MISSOURI, CARTER County
MISSOURI, CHRISTIAN County
MISSOURI, CRAWFORD County
MISSOURI, DADE County
MISSOURI, DALLAS County
MISSOURI, DENT County
MISSOURI, DOUGLAS County
MISSOURI, DUNKLIN County
MISSOURI, GREENE County
MISSOURI, HOWELL County
MISSOURI, IRON County
MISSOURI, JASPER County
MISSOURI, JEFFERSON County
MISSOURI, LACLEDE County
MISSOURI, LAWRENCE County
MISSOURI, MCDONALD County
MISSOURI, MADISON County
MISSOURI, MARIES County
MISSOURI, MILLER County
MISSOURI, MISSISSIPPI County
MISSOURI, NEW MADRID County
MISSOURI, NEWTON County
MISSOURI, OREGON County
MISSOURI, OZARK County
MISSOURI, PEMISCOT County
MISSOURI, PERRY County
MISSOURI, POLK County
MISSOURI, PULASKI County
MISSOURI, REYNOLDS County
MISSOURI, RIPLEY County
MISSOURI, STE. GENEVIEVE County
MISSOURI, ST. FRANCOIS County
MISSOURI, SCOTT County
MISSOURI, SHANNON County
MISSOURI, STODDARD County
MISSOURI, STONE County
MISSOURI, TANEY County
MISSOURI, TEXAS County
MISSOURI, WASHINGTON County
MISSOURI, WAYNE County
MISSOURI, WEBSTER County
MISSOURI, WRIGHT County
NORTH CAROLINA, ALEXANDER County
NORTH CAROLINA, ALLEGHANY County
NORTH CAROLINA, ASHE County
NORTH CAROLINA, AVERY County
NORTH CAROLINA, BUNCOMBE County

NORTH CAROLINA, BURKE County
NORTH CAROLINA, CALDWELL County
NORTH CAROLINA, CATAWBA County
NORTH CAROLINA, CHEROKEE County
NORTH CAROLINA, CLAY County
NORTH CAROLINA, CLEVELAND County
NORTH CAROLINA, GASTON County
NORTH CAROLINA, GRAHAM County
NORTH CAROLINA, HAYWOOD County
NORTH CAROLINA, HENDERSON County
NORTH CAROLINA, JACKSON County
NORTH CAROLINA, LINCOLN County
NORTH CAROLINA, MCDOWELL County
NORTH CAROLINA, MACON County
NORTH CAROLINA, MADISON County
NORTH CAROLINA, MITCHELL County
NORTH CAROLINA, POLK County
NORTH CAROLINA, RUTHERFORD County
NORTH CAROLINA, SWAIN County
NORTH CAROLINA, TRANSYLVANIA County
NORTH CAROLINA, WATAUGA County
NORTH CAROLINA, WILKES County
NORTH CAROLINA, YANCEY County
OHIO, ADAMS County
OHIO, BROWN County
OHIO, CLERMONT County
OHIO, GALLIA County
OHIO, HIGHLAND County
OHIO, JACKSON County
OHIO, LAWRENCE County
OHIO, PIKE County
OHIO, SCIOTO County
OKLAHOMA, ADAIR County
OKLAHOMA, ALFALFA County
OKLAHOMA, BEAVER County
OKLAHOMA, BLAINE County
OKLAHOMA, CANADIAN County
OKLAHOMA, CHEROKEE County
OKLAHOMA, CIMARRON County
OKLAHOMA, CRAIG County
OKLAHOMA, CREEK County
OKLAHOMA, DELAWARE County
OKLAHOMA, DEWEY County
OKLAHOMA, ELLIS County
OKLAHOMA, GARFIELD County
OKLAHOMA, GRANT County
OKLAHOMA, HARPER County
OKLAHOMA, KAY County
OKLAHOMA, KINGFISHER County
OKLAHOMA, LOGAN County
OKLAHOMA, MCINTOSH County
OKLAHOMA, MAJOR County

OKLAHOMA, MAYES County
OKLAHOMA, MUSKOGEE County
OKLAHOMA, NOBLE County
OKLAHOMA, NOWATA County
OKLAHOMA, OSAGE County
OKLAHOMA, PAWNEE County
OKLAHOMA, PAYNE County
OKLAHOMA, ROGERS County
OKLAHOMA, SEQUOYAH County
OKLAHOMA, TEXAS County
OKLAHOMA, TULSA County
OKLAHOMA, WAGONER County
OKLAHOMA, WASHINGTON County
OKLAHOMA, WOODS County
OKLAHOMA, WOODWARD County
SOUTH CAROLINA, ABBEVILLE County
SOUTH CAROLINA, AIKEN County
SOUTH CAROLINA, ANDERSON County
SOUTH CAROLINA, CALHOUN County
SOUTH CAROLINA, CHEROKEE County
SOUTH CAROLINA, CHESTER County
SOUTH CAROLINA, EDGEFIELD County
SOUTH CAROLINA, FAIRFIELD County
SOUTH CAROLINA, GREENVILLE County
SOUTH CAROLINA, GREENWOOD County
SOUTH CAROLINA, KERSHAW County
SOUTH CAROLINA, LANCASTER County
SOUTH CAROLINA, LAURENS County
SOUTH CAROLINA, LEXINGTON County
SOUTH CAROLINA, MCCORMICK County
SOUTH CAROLINA, NEWBERRY County
SOUTH CAROLINA, OCONEE County
SOUTH CAROLINA, ORANGEBURG County
SOUTH CAROLINA, PICKENS County
SOUTH CAROLINA, RICHLAND County
SOUTH CAROLINA, SALUDA County
SOUTH CAROLINA, SPARTANBURG County
SOUTH CAROLINA, UNION County
SOUTH CAROLINA, YORK County
TENNESSEE, ANDERSON County
TENNESSEE, BEDFORD County
TENNESSEE, BENTON County
TENNESSEE, BLEDSOE County
TENNESSEE, BLOUNT County
TENNESSEE, BRADLEY County
TENNESSEE, CAMPBELL County
TENNESSEE, CANNON County
TENNESSEE, CARROLL County
TENNESSEE, CARTER County
TENNESSEE, CHEATHAM County
TENNESSEE, CHESTER County
TENNESSEE, CLAIBORNE County

TENNESSEE, CLAY County
TENNESSEE, COCKE County
TENNESSEE, COFFEE County
TENNESSEE, CROCKETT County
TENNESSEE, CUMBERLAND County
TENNESSEE, DAVIDSON County
TENNESSEE, DECATUR County
TENNESSEE, DEKALB County
TENNESSEE, DICKSON County
TENNESSEE, DYER County
TENNESSEE, FAYETTE County
TENNESSEE, FENTRESS County
TENNESSEE, FRANKLIN County
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TENNESSEE, GRUNDY County
TENNESSEE, HAMBLEN County
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TENNESSEE, HAWKINS County
TENNESSEE, HAYWOOD County
TENNESSEE, HENDERSON County
TENNESSEE, HENRY County
TENNESSEE, HICKMAN County
TENNESSEE, HOUSTON County
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TENNESSEE, LAUDERDALE County
TENNESSEE, LAWRENCE County
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TENNESSEE, LINCOLN County
TENNESSEE, LOUDON County
TENNESSEE, MCMINN County
TENNESSEE, MCNAIRY County
TENNESSEE, MACON County
TENNESSEE, MADISON County
TENNESSEE, MARION County
TENNESSEE, MARSHALL County
TENNESSEE, MAURY County
TENNESSEE, MEIGS County
TENNESSEE, MONROE County
TENNESSEE, MONTGOMERY County
TENNESSEE, MOORE County
TENNESSEE, MORGAN County

TENNESSEE, OBION County
TENNESSEE, OVERTON County
TENNESSEE, PERRY County
TENNESSEE, PICKETT County
TENNESSEE, POLK County
TENNESSEE, PUTNAM County
TENNESSEE, RHEA County
TENNESSEE, ROANE County
TENNESSEE, ROBERTSON County
TENNESSEE, RUTHERFORD County
TENNESSEE, SCOTT County
TENNESSEE, SEQUATCHIE County
TENNESSEE, SEVIER County
TENNESSEE, SHELBY County
TENNESSEE, SMITH County
TENNESSEE, STEWART County
TENNESSEE, SULLIVAN County
TENNESSEE, SUMNER County
TENNESSEE, TIPTON County
TENNESSEE, TROUSDALE County
TENNESSEE, UNICOI County
TENNESSEE, UNION County
TENNESSEE, VAN BUREN County
TENNESSEE, WARREN County
TENNESSEE, WASHINGTON County
TENNESSEE, WAYNE County
TENNESSEE, WEAKLEY County
TENNESSEE, WHITE County
TENNESSEE, WILLIAMSON County
TENNESSEE, WILSON County
TEXAS, ANDERSON County
TEXAS, CHEROKEE County
TEXAS, HENDERSON County
TEXAS, RUSK County
TEXAS, SMITH County
TEXAS, VAN ZANDT County
VIRGINIA, BLAND County
VIRGINIA, BUCHANAN County
VIRGINIA, CARROLL County
VIRGINIA, DICKENSON County
VIRGINIA, FLOYD County
VIRGINIA, GILES County
VIRGINIA, GRAYSON County
VIRGINIA, LEE County
VIRGINIA, MONTGOMERY County
VIRGINIA, PULASKI County
VIRGINIA, RUSSELL County
VIRGINIA, SCOTT County
VIRGINIA, SMYTH County
VIRGINIA, TAZEWELL County
VIRGINIA, WASHINGTON County
VIRGINIA, WISE County

VIRGINIA, WYTHE County
WEST VIRGINIA, BOONE County
WEST VIRGINIA, BRAXTON County
WEST VIRGINIA, CABELL County
WEST VIRGINIA, CLAY County
WEST VIRGINIA, FAYETTE County
WEST VIRGINIA, GREENBRIER County
WEST VIRGINIA, KANAWHA County
WEST VIRGINIA, LINCOLN County
WEST VIRGINIA, LOGAN County
WEST VIRGINIA, MCDOWELL County
WEST VIRGINIA, MASON County
WEST VIRGINIA, MERCER County
WEST VIRGINIA, MINGO County
WEST VIRGINIA, MONROE County
WEST VIRGINIA, NICHOLAS County
WEST VIRGINIA, POCAHONTAS County
WEST VIRGINIA, PUTNAM County
WEST VIRGINIA, RALEIGH County
WEST VIRGINIA, RANDOLPH County
WEST VIRGINIA, ROANE County
WEST VIRGINIA, SUMMERS County
WEST VIRGINIA, WAYNE County
WEST VIRGINIA, WEBSTER County
WEST VIRGINIA, WYOMING County

Thank you,

Lisa C. Baker
Acting THPO
United Keetoowah Band of Cherokee Indians in Oklahoma PO Box 746 Tahlequah, OK 74465

c 918.822.1952
ukbthpo-larue@yahoo.com

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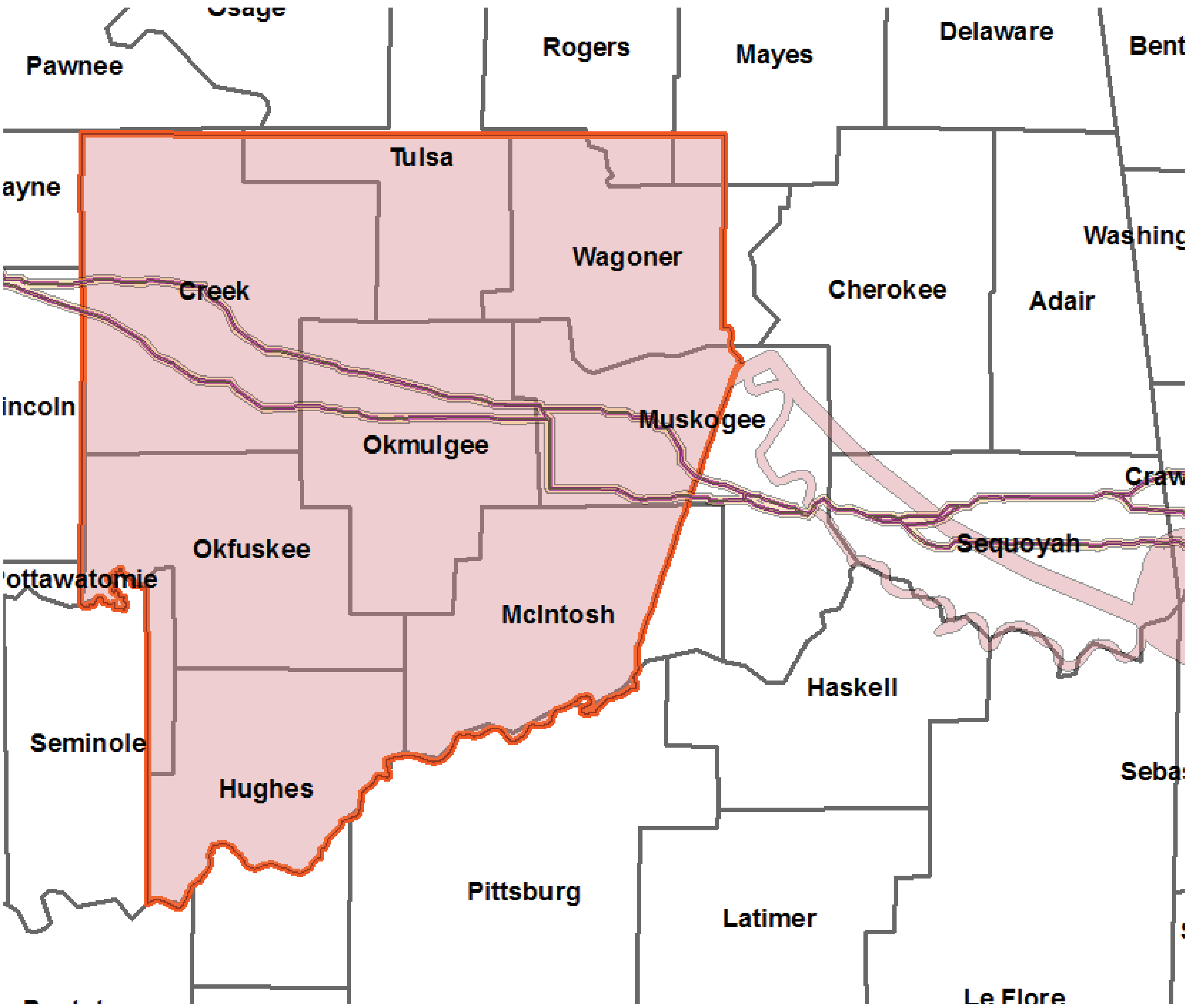
Muscogee (Creek) Nation

Areas of Historic Interest in Oklahoma

Plains Clean Line Project

Counties include: Creek, Okmulgee, Muskogee, Sequoyah counties, Oklahoma



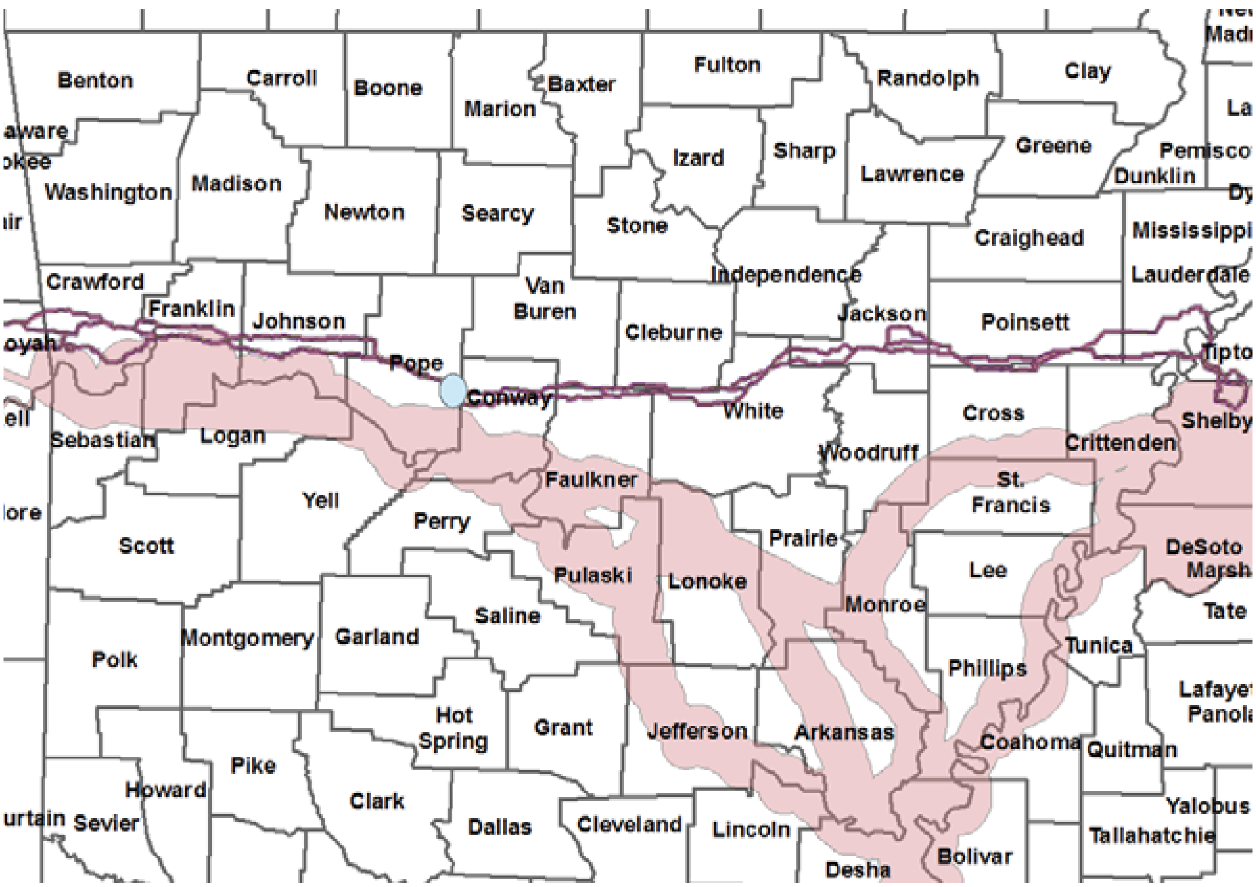
Provided by the Historic and Cultural Preservation Department (2015)

Muscogee (Creek) Nation

Areas of Historic Interest in Arkansas

Plains Clean Line Project

Counties include: Crawford, Franklin and Johnson counties, AR



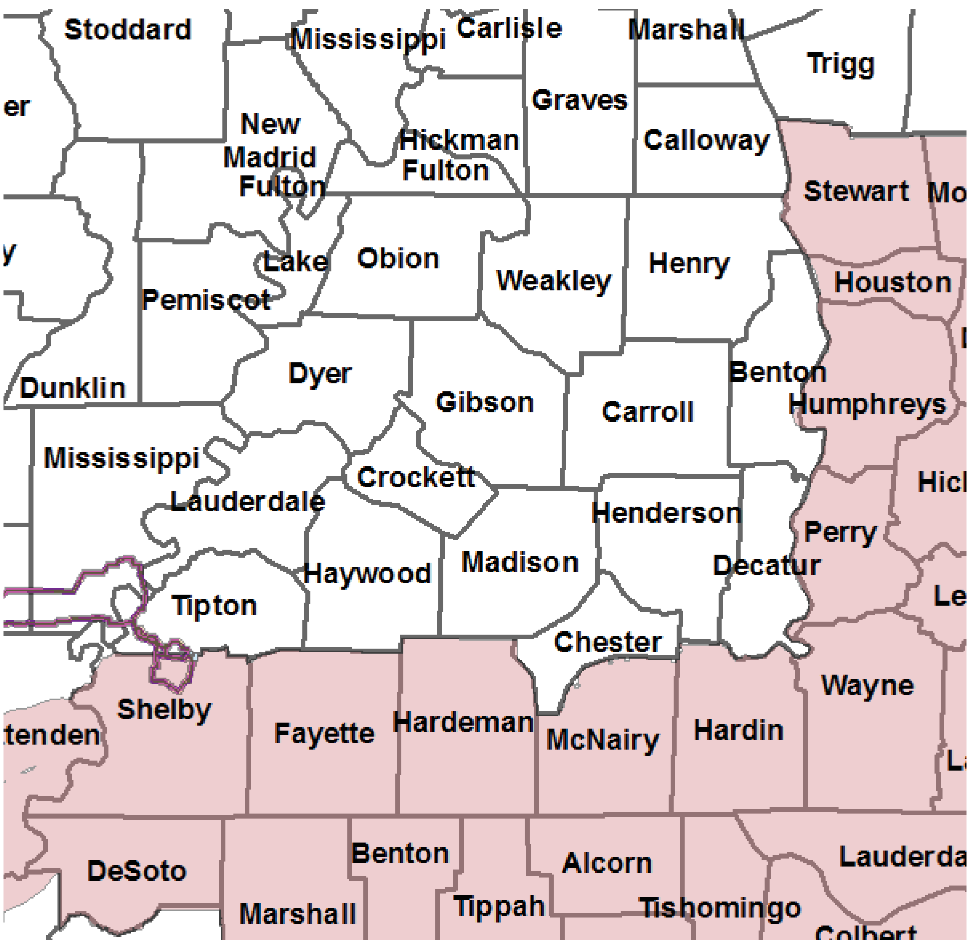
Provided by the Historic and Cultural Preservation Department (2015)

Muscogee (Creek) Nation

Areas of Historic Interest in Tennessee

For The Plains Clean Line Project

Counties include: Shelby, TN



Provided by the Historic and Cultural Preservation Department (2015)

Osage Ancestral Territory
Osage Nation
Tribal Historic Preservation Office
627 Grandview
Pawhuska, OK 74056
Ph: (918) 287-5328
Fax: (918) 287-5376
SEAL OF OSAGE NATION

Appendix B:

LIST OF MUNICIPALITIES AND COUNTIES CONTACTED

U.S. DEPARTMENT OF ENERGY

Plains and Eastern Clean Line
Municipalities and Counties Contacted

First Name	Last Name	Organization
Allen	Dodson	Faulkner County Judge, Arkansas
Brad	Raven	Beaver County Commission, Oklahoma
Carl	Laverty	Harper County Commission, Oklahoma
Charles	Nix	Pointsett County Judge, Arkansas
Don	Sporleder	Lincoln County Commission, Oklahoma
Gene	Wallace	Muskogee County Commission, Oklahoma
Jack	Caubble	Cross County Judge, Arkansas
Jack	Strain	Texas County Commission, Oklahoma
James	Simunek	Garfield County Comission, Oklahoma
Janet	Powell	Franklin County Judge, Arkansas
Jay	Hill	Okmulgee County Commission, Oklahoma
Jeff	Huffman	Tipton County, Tennessee
Jeff	Phillips	Jackson County Judge, Arkansas
Jerry	Holmes	Cleburne County Judge, Arkansas
Jim Ed	Gibson	Pope County Judge, Arkansas
Jimmy	Hart	Conway County Judge, Arkansas
John	Hall	Crawford County Judge, Arkansas
Keith	Schroder	Kingfisher County, Oklahoma
Mark	Lutrell	Memphis County Mayor, Tennessee
Michael	Lincoln	White County Judge, Arkansas
Micheal	Pearson	Logan County Commission, Oklahoma
Mike	Jacobs	Johnson County Judge, Arkansas
Newt	Stevens	District 1 Comissioner, Sapulpa, Oklahoma
Randy	Carney	Mississippi County Judge, Arkansas

U.S. DEPARTMENT OF ENERGY

Plains and Eastern Clean Line
Municipalities and Counties Contacted

First Name	Last Name	Organization
Ray	Watts	Sequoyah County Commission, Oklahoma
Roger	Hooper	Van Buren County Judge, Arkansas
Terry	Roland	Shelby County Commission, Arkansas
Tommy	Roedell	Woodward County Commission, Oklahoma
Travis	Rohla	Major County Commission, Oklahoma
Zach	Cavett	Payne County Commission, Oklahoma

Appendix C:

LIST OF CONSULTING PARTIES

U.S. DEPARTMENT OF ENERGY

Plains and Eastern Clean Line

Agencies/Tribes/Companies Involved in the Development of the PA

Agency/Tribe/Company
Department of Energy, Southwestern Power Administration
Advisory Council on Historic Preservation
Tennesee Valley Authority
Bureau of Indian Affairs - Southern Plains Regional Office
National Park Service
Arkansas Historic Preservation Program - State Historic Preservation Office
Oklahoma State Historic Preservation Office
Tennessee Department of Environment and Conservation, Tennessee Historical Commission - State Historic Preservation Office
Texas Historical Commission - State Historic Preservation Office
Absentee-Shawnee Tribe of Oklahoma
Cherokee Nation
Chickasaw Nation
Choctaw Nation of Oklahoma
Iowa Nation
Kaw Nation
Muscogee (Creek) Nation
Osage Nation Historic Preservation Office
Quapaw Tribe
Sac & Fox Nation
Thlopthlocco Tribal Town of Oklahoma
United Keetoowah Band of Cherokee Indians in Oklahoma
Wichita and Affiliated Tribes
Caddo Nation of Oklahoma
Plains & Eastern Clean Line

Appendix D:

POINTS OF CONTACT LISTS

Plains and Eastern Clean Line
Section 106 PA Implementation Points of Contact

	Agency/Tribe/Company	First Name	Last Name	Title	Office Address	E-mail Address	Phone Number
POC	United States Department of Energy, Southwestern Power Administration, Department of Energy	Aiden	Smith	Vice President, Transmission Strategy U.S. Department of Energy – Southwestern Power		aiden.smith@swpa.gov	
Alternate							
POC	Advisory Council on Historic Preservation	Jaime	Loichinger		401 F Street NW, Suite 308, Washington D.C. 20001-2637	'jloichinger@achp.gov'	202-517-0200
Alternate							
POC	Tennesee Valley Authority	Anita	Masters	Project Manager, NEPA Compliance	1101 Market St. Chattanooga, TN 37402-2801	aemasters@tva.gov	423-751-8697
Alternate	Tennessee Valley Authority	Chuck	Nicholson	Manager, NEPA Compliance	400 West Summit Hill Drive, WT 11B Knoxville, TN 37902-1499	cpnicholson@tva.gov	865-632-3582
POC	Oklahoma State Historic Preservation Office	Melvena	Heisch	Deputy State Historic Preservation Officer	800 Nazih Zuhdi Dr. Oklahoma City, OK 73105-7917	mheisch@okhistory.org	405-522-4484
Alternate	Oklahoma State Historic Preservation Office	Lynda	Schwan Ozan	Architectural Historian	800 Nazih Zuhdi Dr. Oklahoma City, OK 73105-7917	lozan@okhistory.org	405-522-4478
POC	Arkansas Historic Preservation - State Historic Preservation Office	Martha	Miller	State Historic Preservation Officer	323 Center Street, Suite 1500 Little Rock, AR 72201	martha@arkansasheritage.org	501-324-9880
Alternate	Arkansas Historic Preservation Program - State Historic Preservation Office	Steve	Imhoff	Senior Archeologist/106 Review Coordinator	323 Center Street, Suite 1500 Little Rock, AR 72201	steve.imhoff@arkansasheritage.org	501-324-9880
Alternate	Arkansas Historic Preservation - State Historic Preservation Office	Lane	Shields	Staff Archeologist	323 Center Street, Suite 1500 Little Rock, AR 72201	lane@arkansasheritage.org	501-324-9880
POC	Tennessee Department of Environment and Conservation, Tennessee Historical Commission - State Historic Preservation Office	Joseph	Garrison	Historic Preservation Specialist (Review and Compliance, Section 106)	2941 Lebanon Rd. Nashville, TN 37243-0442	Joseph.Garrison@tn.gov	615-532-1550

U.S. DEPARTMENT OF ENERGY

Plains and Eastern Clean Line
Section 106 PA Implementation Points of Contact

	Agency/Tribe/Company	First Name	Last Name	Title	Office Address	E-mail Address	Phone Number
Alternate							
POC	Texas Historical Commission - State Historic Preservation Office	Mark	Wolfe	Executive Director	P.O. Box 12276 Austin, TX 78711-2276	mark.wolfe@thc.state.tx.us	512-936-4323
Alternate	Texas Historical Comission - State Historic Preservation Office	Tiffany	Osburn	Terrestrial Archeologist	P.O. Box 12276 Austin, TX 78711-2276	tiffany.osburn@thc.state.tx.us	512-463-8883
POC	Absentee-Shawnee Tribe of Oklahoma	Joseph	Blanchard		2025 S. Gordon Cooper Drive Shawnee, OK 74801	joseph.blanchard@astribe.com	405-275-4030 ext. 127
POC	Chickasaw Nation	Timothy	Baugh, PhD	Cultural Preservation Specialist	Divison of Historic Preservation P. O. Box 1548 Ada, OK 74821-1548	timothy.baugh@chickasaw.net	580-272-1106 Ext. 62211
Alternate	Chickasaw Nation						
POC	Choctaw Nation of Oklahoma	Ian	Thompson	THPO	P.O. Drawer 1210 Durant, OK 74702-1210	ithompson@choctawnation.com	580-924-8280 ext. 2216
Alternate	Choctaw Nation of Oklahoma	Lindsey	Bilyeu	NHPA Senior Section 106 Reviewer	Historic Preservation Department PO Box 1210 Durant, OK 74701	lbilyeu@choctawnation.com	580-924-8280 x 2631
POC	Iowa Nation	Robert	Fields	THPO	RR 1 Box 721 Perkins, OK 74059	rfields@iowanation.org	405-547-2402
Alternate	Iowa Nation						
POC	Kaw Nation	Ken	Bellmard		PO Box 50 Kaw City, OK 74641	kbellmard@bellmardlaw.com	580-269-2552
Alternate							
POC	Muscogee (Creek) Nation	RaeLynn	Butler	THPO	Cultural Preservation Office PO Box 580 Ocmulgee, OK 74447	raebutler@mcn-nsn.gov	918-732-7678

U.S. DEPARTMENT OF ENERGY

Plains and Eastern Clean Line
Section 106 PA Implementation Points of Contact

	Agency/Tribe/Company	First Name	Last Name	Title	Office Address	E-mail Address	Phone Number
Alternate	Muscogee (Creek) Nation	Johnnie	Jacobs	Manager	Historic and Cultural Preservation Department PO Box 580 Ocmulgee, OK 74447	jjacobs@mcn-nsn.gov	918-732-7733
POC	Osage Nation Historic Preservation Office	Dr. Andrea	Hunter	Director/THPO	627 Grandview Avenue Pawhuska, OK 74056	ahunter@osagenation-nsn.gov	918-287-5671
Alternate							
POC	Quapaw Tribe	Everett	Bandy	THPO	P.O. Box 765 Quapaw, OK 74363	ebandy@quapawtribe.com	888-642-4724
Alternate	Quapaw Tribe	NA					
POC	Sac & Fox Nation	Sandra	Massey		Route 2, Box 246 Stroud, OK 74079	smassey@sacandfoxnation-nsn.gov	918-968-3526 ext. 1048
Alternate	Sac & Fox Nation						
POC	Thlopthlocco Tribal Town of Oklahoma	Charles	Coleman	THPO	PO Box 188 Okemah, OK 74859-0188	chascoleman75@yahoo.com	918-560-6198
Alternate	Thlopphlocco Tribal Town of Oklahoma	Barbara	Canard-Welborn	Advisor	PO Box 188 Okemah, OK 74859-0188	bwelborn@sbcglobal.net	918-560-6198
POC	United Keetoowah Band of Cherokee Indians in Oklahoma	Lisa	LaRue-Baker	Acting THPO	P.O. Box 746 Tahlequah, OK 74465	UKBTHPO-larue@yahoo.com	918-822-1952
Alternate	United Keetoowah Band of Cherokee Indians in Oklahoma	Tim	GoodVoice	Tribal Administrator	P.O. Box 746 Tahlequah, OK 74465	tgoodvoice@unitedkeetoowahband.org	918-822-1952
POC	Wichita and Affiliated Tribes	Gary	McAdams		PO Box 729 Anadarko, OK 73005	gary.mcadams@wichitatribe.com	405-247-2425 Ext. 169
Alternate	Wichita and Affiliated Tribes	Charles	Tippeconnic	Tribal Administrator	PO Box 729 Anadarko, OK 73005	charles.tippeconnic@wichitatribe.com	405-247-2425
POC	Plains & Eastern Clean Line	Jason	Thomas		1001 McKinney, Suite 700, Houston, TX 77002	JThomas@cleanlineenergy.com	832-319-6372

Appendix E:

HISTORIC PROPERTIES IDENTIFICATION PLAN

Historic Properties Identification Plan

for the

PLAINS & EASTERN
CLEAN LINE

October 2015

FINAL DRAFT

Prepared for:

CLEAN LINE
ENERGY PARTNERS

Prepared by:

SWCA®
ENVIRONMENTAL CONSULTANTS

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Background and Purpose

Clean Line Energy Partners LLC of Houston, Texas, (parent company of Plains and Eastern Clean Line LLC and Plains and Eastern Clean Line Oklahoma LLC, which are two entities collectively referred to herein as “Clean Line”) is proposing to construct, own, and operate the Plains & Eastern Clean Line transmission project (the Project). This Project would deliver renewable energy from the Oklahoma Panhandle region to the mid-south and southeastern United States, an area that has a demand for new, low-cost renewable power. The U.S. Department of Energy (DOE), although still deciding whether to participate in the Project, is considering the effects of the Project on cultural resources pursuant to the National Environmental Protection Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA). In accordance with Stipulation V of the Programmatic Agreement (PA), the purpose of this Historic Properties Identification Plan (HPIP) is to define the scope and methods of identification efforts, and criteria used to evaluate cultural resources on the Project in compliance with Section 106 of NHPA, Title 36 Code of Federal Regulations (CFR) Part 800.4, and other applicable state, agency, and Native American Tribal standards and regulations.

1.0 Determination of Scope and Level of Identification Efforts

Standard I of the *Secretary of the Interior’s Standards and Guidelines for Archeology and Historic Preservation* instructs that the identification of historic properties be “undertaken to the degree required to make decisions.” The initial step is to determine the scope of identification needed and level of effort required to constitute a “reasonable and good faith effort” per Section 106 (36 CFR 800.4[b][1]) requirements. The U.S. Department of Energy (DOE) with input from the applicant, agencies, and Consulting Parties determines the area of potential effects (APE) and level of effort. The APE for the Project is defined in the PA, Stipulation IV (A, B).

1.1 Inventory Area

The inventory areas encompass the APE for the Project. The APE is the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties. An APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking, such as direct versus indirect effects. Inventories may cover a broader area than the APE to allow latitude for adjustments in the design process.

1.1.1 Inventory Coverage for Areas of Direct Effect

a) The APE for direct effects for the HVDC transmission line, AC Collection System transmission lines, and AC interconnection transmission lines will be the length and width of all ROW easements for these Project components. The APE for these components will also include easements acquired for other proposed permanent Project features and temporary workspaces, including marshalling yards, storage areas, and waste disposal areas, as appropriate. The APE for direct effects for temporary workspaces associated with these Project components will be the limits of the disturbed areas.

b) The APE for direct effects for new access roads in areas outside of the Project components described in part a. above will be the full length and width of the new access road easement. For existing access roads that are improved as part of the Project, the APE for direct effects will be the limits of the disturbed areas.

c) The APE for direct effects for other permanent Project facilities such as converter stations, substations, and ancillary facilities, as well as temporary work areas associated with these Project components will be the limits of the disturbed areas.

d) The APE for direct effects excludes existing roads that the proposed Project will use but not improve, and existing facilities to which the proposed Project will interconnect, but not expand.

Note: Please refer to Section 3.1.1.1.2 for exceptions to inventory areas within the APE for direct effects.

1.1.2 Inventory Coverage for Areas of Indirect Effect

The inventory coverage for potential indirect effects will encompass the geographic area including and extending from the APE for direct effects (defined above) where the Project has the potential to change the character of a property's use, physical features, setting, or viewshed that qualify a property for inclusion on the National Register of Historic Properties (NRHP). Indirect effects on historic properties may include visual, audible, and atmospheric elements.

a) The APE for indirect effects is the area measured up to 0.5 mile from above-grade features of the Project, or within the extent of the viewshed, whichever is closer. Indirect visual effects from temporary access roads occurring at ground level and similar work areas without an above-ground profile will not be considered when defining the APE for indirect effects.

b) Where the APE for indirect effects includes historic properties that are historic properties of traditional religious and cultural significance, Traditional Cultural Properties (TCPs), National Historic Landmarks, or National Historic Trails for which setting, feeling, and/or association contribute to eligibility, additional analyses may be required and the APE for indirect effects may be modified accordingly following procedures in Stipulation IV.B in the PA.

The APE extends across the combined areas of direct and indirect effects.

1.2 Phased Approach to Historic Properties Inventory

Compliant with stipulations and allowances in the PA, the DOE has determined to adopt a phased approach to identification and evaluation efforts. DOE will use such an approach because the undertaking consists of large land areas, potential effects on historic properties are multi-state in scope, this type of project (transmission line development) results in effects that are similar and repetitive across certain classes of historic properties, and effects to historic properties cannot be fully determined prior to approval of the undertaking. The phases will be carried out according to the procedures set forth in the PA. Inventories shall address at minimum the full Project footprint comprising areas of direct potential effect where historic properties have the potential to be present. For areas of indirect potential effect, inventories will address at minimum the full Project footprint and 0.5 mile beyond (or to the visual horizon, if closer) where historic properties for which setting, feeling, and/or association are qualifying characteristics of NRHP eligibility have the potential to be present.

2.0 Review of Existing Information

2.1 Archival Research

2.1.1 Methods

Known and potential cultural resources were reviewed to provide data for selection of feasible routes. Data collection remains an ongoing process that will continue throughout identification and evaluation. Files and databases maintained by each state are the primary and standard source of existing information on archaeological resources and historic buildings and structures (Table 2.1). Outreach by DOE and Clean Line to agencies administering Tribal and federal lands sought additional information, as did the NEPA processes undertaken by DOE (see Draft Environmental Impact Statement [FEIS; DOE 2015]). The NEPA process also included public outreach regarding cultural resource concerns. As outlined in the PA, the DOE's consultation on identification and evaluation of historic properties is to remain ongoing throughout the Section 106 process.

Clean Line updates the database when relevant new information arises, such as results from research and consultation. From each source described above, Clean Line collected data regarding a specific archaeological site name or number, spatial parameters, chronologic period, NRHP recommendation, and other pertinent data, such as related technical reports, and compiled these into a geographic information system (GIS) database to inform the Project siting process. Clean Line inspected the collected data for gaps in information, requested missing data from the appropriate sources and, when obtainable, entered the additional data into the database.

Consultation with each state's repositories for cultural resources information provided data regarding previously documented archaeological sites, historic-age structures, NRHP-listed resources, prehistoric or historic districts, resource surveys, and other cultural resources of concern. This search extended to the 0.5-mile area surrounding all components for the Project with established siting areas. In some cases the search extended beyond 0.5 mile.

In Oklahoma, Clean Line gathered data on existing cultural resources from the sources described as follows. The review of topographic maps and archaeological site files took place at the Oklahoma Archeological Survey (OAS) in Norman, Oklahoma. Maps reviewed in the Oklahoma state files also included General Land Office (GLO) plats, most dating to the 1890s, which contain information on possible historic resources. At the Oklahoma State Historic Preservation Office (SHPO), Clean Line reviewed the Oklahoma Landmark Inventory database for information on historic architectural resources and surveys conducted in the state. In addition, Clean Line reviewed NRHP and determination of eligibility records housed at the SHPO.

In Arkansas, Clean Line reviewed the archaeological site files and Automated Management of Archeological Site Data in Arkansas (AMASDA) records housed at the Arkansas Archaeological Survey facility in Fayetteville, Arkansas. The AMASDA records include information on archaeological sites, previously conducted archaeological projects, archaeological reports, and radiometric assays on archaeological specimens from Arkansas. To obtain information on historic, above-ground resources, review of historic property (i.e., buildings, structures, or objects) files took place at the Arkansas Historic Preservation Program (AHPP) facility in Little Rock. Because the AHPP files are not in a digitized format, data collection from the AHPP included a visual review of paper 7.5-minute U.S. Geological Survey (USGS) topographic maps and digitization of relevant data collected during that review for use in the GIS database for the Project. Finally, potential routes for the Trail of Tears delineated in *Footprints Across Arkansas Trail of Tears Removal Corridors for the Cherokees, Chickasaws,* *Choctaws, Creeks and Seminoles* were digitized and added to the GIS database of potential cultural resources (Horne 2006).

For Tennessee, Clean Line reviewed the archaeological site files and reports housed at the Tennessee Division of Archaeology facility in Nashville, Tennessee, for information on previously recorded cultural resources. In addition, Clean Line reviewed the historic property (i.e., buildings, structures, or objects) files housed at the Tennessee Historical Commission facility in the Clover Bottom Mansion, Nashville, Tennessee. Neither the Tennessee Division of Archaeology nor the Tennessee Historical Commission files are in electronic format; therefore, Clean Line collected data from material files on-site at these repositories. Clean Line digitized all relevant data collected during that on-site review into the GIS database for the Project.

In Texas, Clean Line reviewed site files, records, and maps housed at the Texas Archeological Research Laboratory and the Texas Historical Commission library for information on previously recorded cultural resources and projects. The Texas Historical Commission library information includes the Texas Archeological Sites Atlas online database, which lists any previously recorded surveys and historic or prehistoric archaeological sites located in or near the analysis areas.

In addition to reviewing sources at cultural resources repositories in the states listed above, further efforts proceeded to gather data on other potential cultural resources within the Project. These efforts focused on information related to the general routes of linear features such as historic trails and other historic or Tribal resources not yet documented within the existing state cultural preservation records. Because of the commonly known occurrence of the Trail of Tears National Historic Trail (NHT) in the area, Clean Line expanded the search to information related to the U.S. Department of the Interior National Park Service's National Trails System. Other than the National Trails System documentation, Oklahoma is the only state with comprehensive historical map atlases and GLO plats available as standard components for historical records searches. Sources used in these efforts included data on file with the National Park Service and volumes of the *Historical Atlas of Oklahoma* (Goins and Goble 2006; Morris et al. 1986). Clean Line also conducted a review of historical maps published by the USGS, available through the publicly accessible TopoView program, to obtain information on historical resources and landscape modifications through time. In addition, Clean Line investigated information collected from Tribal, agency, and public meetings that related to cultural resources and added this information to the database in an appropriate manner.

DOE and Clean Line will continue to add to the cultural resources database with specific resource information as consultation and input from Tribal Historic Preservation Officers (THPOs), regulatory agencies, stakeholders, and other identified consulting parties continues under the PA. Clean Line will continue to incorporate this information into the decision-making processes regarding cultural resources identification and evaluation. .

Clean Line began intensive data collection from these data sources in July 2012. After the initial July 2012 data collection efforts, Clean Line performed additional research at Oklahoma, Arkansas, and Tennessee repositories in November 2012, May 2013, July 2013, and June 2015, as well as October 2013 in Oklahoma and Arkansas but not Tennessee. Data collection for Texas was conducted in July 2013 and June 2015. As noted, data collection efforts will be ongoing throughout the course of the Project.

Table 2.1
Summary of Data Sources for Cultural Resources

Information	Data Sources
Previously documented cultural resources	Arkansas Archeological Survey, including Automated Management of Archeological Site Data in Arkansas records Arkansas Historic Preservation Program Oklahoma Archeological Survey (OAS) Oklahoma Landmarks Inventory housed with the Oklahoma SHPO Tennessee Division of Archaeology Tennessee Historical Commission National Register of Historic Places dataset Texas Archeological Research Laboratory Texas Historical Commission, including the Texas Archeological Sites Atlas database
Cultural resources identified with approximate routes of historic-age trails, roads, and railroads	Historical Atlas of Oklahoma (1986 and 2006 editions) National Trails System, National Park Service *Footprints Across Arkansas* – Trail of Tears routes
Possible locations of as yet undocumented cultural resources	1890s series General Land Office plat maps on file with the OAS Tribal Allotment Records/Maps and Tribal Sources Aerial Photography Comments from DOE and Clean Line Tribal, agency, and public meetings (see Section 2.1.4.2, "Consultation and Outreach") Historical USGS maps

2.2 Consultation to Compile Known or Potential Concerns

Identification of resources entails consultation with those who may have knowledge or concerns for resources that could be affected. This process is ongoing and DOE retains the responsibility for conducting consultation with other federal agencies, SHPOs, THPOs and affected Tribal governments, and other interested parties, such as local government and non-government organizations concerned with historic preservation. As reiterated in the PA (Whereas Clause 23), Clean Line, as the applicant for Federal approval, has been authorized by DOE to initiate consultation with the SHPOs and others pursuant to 36 CFR §800.2(c)(4) in letters dated January 17, 2013, to the Arkansas, Tennessee, and Oklahoma SHPOs and April 23, 2013, to the Texas SHPO; however, responsibilities for all findings and determinations remain with DOE on these matters.

2.2.1 SHPOs

SHPOs provided input on specific resources and general concerns within their respective states in relation to the Project. Arkansas SHPO specifically provided a list of known resources on or near the route network. Consultation is ongoing and will continue under the PA, and all input received to date has been integrated into the Project data to be assessed during identification efforts.

2.2.2 Tribes

The Native American or Tribal resources may be cultural resources (whether archaeological, historic building or structural resources, or other resource types), and are particularly distinguished when Native American Tribes attach traditional religious and cultural significance as specified in Section 106 regulations. These may additionally include resources distinguishable as TCPs (Parker and King 1998) and sacred sites such as considered under Executive Order 13007. For the consideration of resources important to Tribes, federal regulations require DOE to consult with Native American Tribes and to afford a reasonable opportunity for each participating Tribal government "to identify its concerns about historic properties, advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance, articulate its views on the undertaking's effects on such properties, and participate in the resolution of adverse effects" (*Participants in the Section 106 process*, 36 CFR 800.2[c][2][ii][A]). Consultation with THPOs regarding Project activities on tribal land is required under 36 C.F.R. § 800.3(c). Beginning in March 2012, DOE has coordinated Tribal consultation, which is an ongoing process that will continue through the duration of the Project as defined in the PA. To date, multiple Tribes have provided data on resources and concerns that will be addressed in identification efforts.

2.2.3 National Park Service

The National Park Service has administrative responsibilities for the Trail of Tears NHT under the United States Secretary of the Interior, pursuant to the National Trails System Act of 1968, as amended, and for the Route 66 Preservation Program under Public Law 106-45 enacted in 1999. Because the Trail of Tears NHT and historic Route 66 are in the Project area, the National Park Service – National Trails System Office is participating in the DOE's consultation. The National Park Service has provided DOE and Clean Line data on the Trail of Tears NHT. Clean Line will analyze this route in addition to others routes identified in the background review.

Two National Historic Landmarks (NHLs), that of the Civil War Battle of Honey Springs and the Nodena site, are proximate to analyzed alternatives of the Project area (DOE 2015). The NHL program is administered by the National Park Service and NHLs receive further considerations under the following laws and regulations. Should these or any other NHL be determined to be in the APE, per the PA, DOE will, to the maximum extent possible, undertake appropriate planning as defined in Section 110(f) of the NHPA (recodified at 54 USC §306107) and 36 CFR §800.10).

2.2.4 Other Concerned or Consulting Parties

The U.S. Army Corps of Engineers has oversight of archaeological deposits in their areas of jurisdictional responsibilities, including areas along major rivers, lakes, streams, ponds, and wetlands. The Bureau of Indian Affairs, Eastern Oklahoma Region grants rights-of-way over and across trust or restricted land. The Tennessee Valley Authority has oversight for the project interconnect in Tennessee. These areas may be addressed through pedestrian survey, coring, augering, or other methods for identifying resources including those that contain deeply buried deposits.

3.0 Identification of Cultural Resources

Cultural resources are nonrenewable representations of our human past and heritage, which, per DOE Policy 141.1, "include, but are not limited to, the following broad range of items and locations:

- Archaeological materials (artifacts) and sites that date to the prehistoric, historic, and ethnohistoric periods and that are currently located on the ground surface or buried beneath it;
- Standing structures and/or their component parts that are over 50 years of age and are important because they represent a major historical theme or era, including structures that have an important technological, architectural, or local significance;
- Cultural and natural places, select natural resources, and sacred objects that have importance for American Indians; and
- American folklife, traditions, and arts." (DOE 2001)

For the purposes of this HPIP, cultural resources include 'historic properties' as defined in the NHPA, 'archaeological resource' as defined in the Archaeological Resources Protection Act (ARPA), and 'cultural items' as defined in the Native American Graves Protection and Repatriation Act (NAGPRA) (DOE 2001).

In the identification efforts, cultural resources include three potentially overlapping categories: archaeological resources, historic buildings and structures, and Tribal resources. Archaeological resources are primarily ground level or subsurface cultural resources. These occur "where the remnants of a past culture survive in a physical context that allows for the interpretation of these remains" (Little et al. 2000:7). Historic buildings and structures are primarily aboveground sites and features, often distinguished by architecture or engineering characteristics. These may include Century Farms or Centennial Farms and Ranches (Oklahoma Historical Society n.d.; Center for Historic Preservation n.d.), and can extend to those resources' historic settings that continue to historically convey a place's historic character, such as through its persisting rural and agricultural values. Within these considerations, examples of Tribal resources are as described above in Section 2.2.2. "Tribes." All three categories may include TCPs and sacred sites.

3.1 Field Inventory

The field inventory will comply with state, tribal, and federal guidelines and the accepted professional practices on respective state, tribal, or federal lands. The Secretary of Interior *Identification Protocols and Guidelines* (www.cr.nps.gov/local-law/arch_stnds_2.htm) provide general standards that will be coordinated with specific agency and state protocols to ensure compliance. Clean Line, with DOE oversight, will conduct identification activities to gather information about historic properties in an area. The scope of these activities will depend on the following: existing knowledge about properties; goals for survey activities developed in the planning process; and current management needs (consistent with Secretary of Interior Standard I for Identification).

Supervising cultural resources personnel for the Project will meet the Secretary of the Interior's (SOI) Professional Qualifications Standards (48 FR 22716 or 36 CFR 61). Federal and state guidelines and standards, including qualifications, are articulated in the following resources:

- Secretary of Interior's *Guidelines for Identification of Historic Properties.*
- Oklahoma SHPO's *Historic Preservation Resource Identification* (Fact Sheet 4; see also Fact Sheets 10, 12, and 16).
- *Guidelines for Archeological Fieldwork and Report Writing in Arkansas*, as revised and in effect January 1, 2010, and *A State Plan for the Conservation of Archeological Resources in Arkansas*.

- *Tennessee SHPO Standards and Guidelines for Archaeological Resource Management Studies* as revised in March 2009. The guidelines request that consultants should consult with the Federal Programs Archaeologist concerning specific projects and project areas.
- *Archaeological Survey Standards for Texas* by the Council of Texas Archeologists and Texas Historical Commission.

To incorporate the expertise of Tribes in identification of TCPs, sacred sites, and other concerns, the Project will provide the opportunity for Tribal involvement during surveys in areas of Tribal interest defined in Appendix C (Tribal maps) of the PA. Credentials and qualifications of the Tribal personnel shall be within the purview of the individual Tribes. Clean Line will assume that individuals selected by the Tribes are officially recognized as having the capabilities to perform cultural property identification. To address areas, concerns, and resources specific to each tribe, Clean Line will develop arrangements and protocols with individual Tribes (Section 3.1.1.3 below).

3.1.1 Fieldwork

The investigations are divided into archaeological and architectural components since the different resources require different expertise sets and have different documentation and evaluation protocols. On sites with both archaeological and architectural components, surveyors will evaluate and document the resources in an integrated manner. Clean Line will integrate the results of the previously discussed background research, including data from consultation, with the field methodology to address known concerns. Specifically, all resources or concerns identified in the background review are defined spatially and incorporated into GIS layers that will guide identification efforts.

Clean Line will coordinate field activities with DOE and other parties as stipulated within this HPIP to keep parties apprised of anticipated inventory timing. Clean Line or Clean Line’s consultant will make all reasonable efforts to send county-specific schedules 30 days prior to field surveys, and tract-specific schedules two to three weeks in advance, notifying Tribes and other concerned parties of activities within their defined areas of concern.

3.1.1.1 Archaeological Investigations

The following archaeological survey standards for the Project components comply with Secretary of Interior Standards and Guidelines for Identification (www.cr.nps.gov/local-law/arch_stnds_2.htm) and the above-noted state identification standards (Fact Sheet 14). Applicable state, Tribal, and federal standards will augment these protocols. Designed as baseline protocols work for archaeological surveys, these standards do not limit additional work (e.g., more shovel tests or backhoe trenches) that may be deemed necessary to locate, delineate, and evaluate archaeological sites or assess the potential for significant cultural resources.

3.1.1.1.1 Professional Qualifications

Archaeological investigations will be supervised in the field by an archaeologist who meets the U.S. Secretary of the Interior’s Professional Qualification Standards for Archeology (48FR 22716 or 36 CFR Part 61). Field personnel will have experience performing cultural resource investigations.

3.1.1.1.2 Field Protocols

The Project will include both linear and areal survey areas. The following constitute baseline survey standards that will be applied except in areas where federal, state, or Tribal standards require modification. For example, The Tulsa District of the U.S. Army Corps of Engineers requires 100 percent survey of all permit and fee lands in accordance with district guidelines and best archaeological practices that are consistent with requirements in surrounding states. Additional testing will be conducted, or restricted (as potentially at known TCPs and sacred sites), as warranted upon the discretion of the Principal Investigator and field supervisors or at direction of the DOE including input from Consulting Parties to the PA. Shovel testing standards presented in Table 3.1 will apply to the Project surveys. More robust shovel testing will be conducted in targeted areas, such as near known resources, areas of concern identified by Consulting Parties, locales where deeper impacts are expected, and in settings where regional site distribution patterns show with a higher potential for cultural resources. In compliance with Arkansas state requirements, these standards will be augmented. Arkansas state standards require intervals of no more than 20 meters (m), increased to 10 m in areas with heavy groundcover where a site is suspected. In areas where surficial cultural materials are present, shovel tests will be no more than 5 m in Arkansas.

Table 3.1.
Oklahoma, Tennessee, and Texas Shovel Test Standards

Transect Interval	Not greater than 30 meters	
Shovel Tests		
Project Area Size	**Shovel test density**	
0-2 acres	3 per acre	
>3-10 acres	2 per acre	
>11-100 acres	1 every 2 acres	
>101-200 acres	1 every 3 acres	
Linear Projects	<100-foot (30-m) wide corridor	16 per mile
Number of Shovel Tests required to define site boundaries: depending on surface visibility, a minimum of 6 – more for larger sites		

*_Adapted from Osage Nation Historic Preservation Office Archaeological Block Survey Standards (as revised November 2014) and Texas Historical Commission/Council of Texas Archaeologist standards._

The identification efforts will focus on the extent of cultural resources intersecting the APE and reflect the scale and nature of Project-related ground disturbing activities. Surveyors will conduct identification efforts within the inventory area and, where warranted and subject to landowner approval, areas that extend beyond the APE to determine site boundaries. Surveyors will tailor methods to address the nature of the Project and existing conditions, including depth of Project disturbance, existing disturbances, landform slope, surface visibility, available exposures, known concerns, previous research, and archaeological landscape potential. Identification efforts will use procedures consistent with Project management needs and the character of the investigated area.

Field investigations will involve a typical configuration of multiple-person crews surveying in systematic parallel transects at 30-m (or 20-m in Arkansas) intervals. The surveyors will examine the ground surface and available exposures such as cut banks and other erosional profiles for cultural resources. Surface and subsurface exposures are expected to vary throughout the survey area with some areas having extensive surface visibility with others having minimal or none.

In areas with a potential for buried sites commensurate with depth of the APE, archaeologists will systematically excavate shovel tests at the previously defined intervals, increasing the number of shovel tests as needed to delineate site boundaries. The surveyors will adjust the number of shovel tests depending on previous disturbances, the nature of the soils, and the topographic setting. Archaeologists will not excavate shovel tests in the following areas:

- slopes greater than 12 percent

- shallow gullies and eroded lands (excluding ravines)
- gravel pits
- dumps
- mines
- water bodies, standing water
- rock outcrops
- areas of modern disturbance sufficient to remove the archaeological potential
- previously surveyed areas that have no documented cultural resources. For results of previous cultural resources survey to qualify, the work must have been conducted in in accordance with current practices.

The archaeological investigations will assess modern disturbances and their effects on the archaeological potential relative to the APE on a case-by-case basis.

Surveyors will excavate all shovel tests in 10-centimeter (cm) arbitrary levels to 1 m in depth or to culturally sterile deposits, whichever comes first. Shovel tests will be 30 cm in diameter or per side and excavated to the bottom of Holocene deposits, if possible. Sediments will be screened through ¼-inch (0.64-cm) mesh unless high clay or water content requires that they be troweled through. The location of each shovel test will be plotted with a GPS unit and recorded in logbooks and on appropriate Project field forms.

Archaeologists will initiate the assessment of potential for deeply buried cultural deposits within the inventory area prior to starting field investigations; however, such an assessment will include multiple steps: 1) a review of available geomorphologic, geologic, and soil data; 2) initial field assessments; 3) mechanical deep testing; and as needed 4) geoarchaeological studies. Archaeological deep testing may be warranted in urban settings where the potential exists for buried archaeological deposits. At a minimum, the initial step shall include review of U.S. Department of Agriculture soil surveys and geologic maps. Subsequent to the background review, initial field investigations will use shovel testing and available exposures to verify the depth of archaeological potential. Based upon the information from the first two steps, if there is a potential for deeply buried cultural deposits within the depth of impacts, deeper subsurface investigations (such as mechanical coring, backhoe trenches or other methods acceptable to the SHPOs/State Archaeologists) will be considered. In specific cases such as complex alluvial terraces on major drainages, geoarchaeological studies to define the chronology and condition of deposits may be warranted to adequately assess the archaeological potential. In addition to notification stated in Section 4.1.1., Clean Line will coordinate with Tribes when conducting cultural resource identification efforts involving machinery within one mile of churches identified by Tribes and will avoid work at those churches/cemeteries during services and funerals. Prior to the commencement of identification efforts, the Tribes will identify the specific churches where such protocols should be utilized.

Backhoe trenching is the preferred method of assessing the potential for deeply buried cultural deposits commensurate with depth of the APE. The feasibility of alternate methods, such as augering, coring, or remote sensing (e.g., ground-penetrating radar, magnetometry), will require consultation with DOE and other concerned parties. Archaeologists will place trenches in 100-m (325-foot) intervals, with tighter intervals, if necessary. Trench placement will be determined in the field by the Principal Investigator or field director on the basis of the level of disturbance within the survey area, the location of buried utilities, and the preservation potential for archaeological sites. Each trench will seek to expose an area minimally 3 m (10 feet) long by 0.62 m (1.2 feet) wide, and excavated to the base of Holocene soils (i.e., culturally sterile subsoil) or to the depth of Project impacts, whichever comes first. Trenching will stratigraphically remove soils, and archaeologists will selectively screen sediment to assess presence or absence of cultural materials. Upon completion, all excavations will be backfilled and leveled. The backhoe operator will carefully scrape the surface during backfilling to minimize additional ground disturbance. An archaeologist will monitor all trenching while excavations are underway. Once the trench is excavated, archaeologists will scrape down both walls of the trench, examining the profiles for artifacts, features, or other cultural manifestations. All subsurface testing will comply with Occupational Safety and Health Administration (OSHA) (29 CFR Part 1926) and the Project's standard operating procedures.

Surveyors will record cultural resources older than 45 years as sites or isolated finds as appropriate. Each resource in the survey area will be inspected or shovel-tested to determine its boundaries, locations of features, artifact concentrations, and formal tools. In areas with a potential for buried deposits, two consecutive negative shovel tests will serve as criteria to define boundaries. Surveyors will explore cultural resources encountered in the survey area as much as possible with consideration given to land access constraints. Where land access constraints exist, assessments made on components extending beyond the Project corridor or area will use literature reviews, aerial photography, modeling, and other approaches where possible to compensate for restricted access. To the extent feasible at the survey level, the objective of investigations will be to gather sufficient information to support a determination of eligibility under NRHP criteria. Fieldwork at previously recorded sites will ensure the existing data comports with current standards, establish the relationship between the site and the current Project area, and update current conditions of the site for assessment of changes that may affect prior determinations of eligibility.

Archaeologists will document artifacts and features in the field using photography, sketches, tracings, and verbal descriptions. Archaeologists will seek Tribal concurrence prior to taking any photographs of confirmed ceremonial grounds or other sensitive areas identified by Tribes. No photographs of human remains or funerary contexts will be published without approval of consulting Tribes. Documentation will focus on attributes of artifacts that provide temporal, cultural, technological, and other data needed to interpret and evaluate sites.

Clean Line will address complex resources consisting of multiple contributing property types, such as the Trail of Tears and Route 66, in accordance with resource-specific research designs as discussed in Section 8.0. The approach to these and other linear resources includes multiple phases of intensive archival review, development of expected resource types, specific field methodologies to assess the presence of the resource types, and evaluation criteria.

3.1.1.2 Architectural Survey: Historic Buildings, Structures, Sites, Objects, and Districts

Architectural historians will identify and evaluate above-ground historic resources to assess direct and indirect effects from the Project. State, tribal, and federal regulations, standards, and guidelines provide protocols for the identification and evaluation of historic above-ground resources on respective state, tribal, and federal lands. Architectural historians that meet the SOI Professional Qualifications Guidelines (36 CFR 61) will lead all work. In accordance with SOI protocols defined *in Standards for Preservation Planning, Identification, and Evaluation,* and with Section 106 review procedures, the architectural historians will conduct a thorough and systematic background review prior to the field investigations. As the initial phase in identification efforts, the objective of the background review is to identify known historic-age resources that would potentially be directly or indirectly affected by the Project. The architectural historians will identify possible historic properties within the areas of direct effects and a 1.0-mile-wide (0.50-miles on either side of centerline) area of potential indirect effects (aka. viewshed) where a property's setting has the potential to be significant to its overall historic character. A systematic review of the study area to define potential above-ground historic resources and their associated historic contexts will use aerial photographs spanning from the late 1930s to current, 7.5-minute USGS topographic maps, GLO maps, Tribal allotment maps/records, county maps, data sets on standing structures, and established state historic contexts. The review will focus on the buildings, structures, objects, sites, and/or districts within the project area that were constructed 45 years prior to the active project survey period. Clean Line will then incorporate any identified potentially historic above-ground resources into GIS layers for further assessment and plot these resources on current Project maps to guide field identification efforts.

3.1.1.2.1 Architectural Inventory in Areas of Direct Effects

Within the area of potential direct effects where direct access to resources is available, the background review data, augmented by observations during the archaeological survey, will identify architectural resources that warrant evaluation and documentation. Architectural historians will then document and assess these resources. When possible, the architectural historians will record the approximate date of construction and rationale for the date assigned, architectural styles and function, building materials, techniques of construction, and construction sequence. Furthermore, the surveyor will follow all state-specific protocols regarding historic resources documentation and complete related survey forms. Documentation will include a sketched site plan drawn to-scale of the major structures (e.g., house, barns) that are readily visible. Site sketch maps also will show rooflines and locations of chimneys. In addition to sketch maps, surveyors will photograph each structure or structural remnant on-site. Architectural historians will take photographs that illustrate the setting and relationship of buildings, structures, and foundations or remains to each other and to the site as a whole. Documentation of historic above-ground resources and engineering works within the direct effects will be completed on the state-appropriate forms (see Section 5.0).

3.1.1.2.2 Architectural Inventory in Areas of Indirect Effects

Within the area of potential indirect effects, the architectural survey will be at the reconnaissance level and will include an examination and evaluation of buildings, structures, objects, and/or districts identified in the background review as potential above-ground historic resources whose viewshed could be affected by the Project (i.e., proposed transmission line visible from resource). As previously noted, the inventory area will cover a 0.5-mile buffer on either side of the proposed Project line. In this indirect effects inventory area, access for resource examinations will be mainly limited to public roads and public places. Due to these limitations, full access to all resources for detailed assessments within the 1-mile wide buffer will not be possible. In addition, documentation of historic above-ground resources within the indirect effects will not include the completion of the state-appropriate forms. Detailed surveys of resources beyond publicly accessible areas would be contingent upon special permission from landowners.

The survey will be a systematic process where architectural historians will assess resources as to age, historic integrity, possible significance and then potential visual impacts from the Project. The field assessment will consist of a survey of all accessible previously identified potential historic resources in the Project area through vehicular and pedestrian reconnaissance.

Any identified historic-age, potentially significant resource will be photo documented and added to a historic resource list of properties. Architectural historians will document each resource or resource group using a project-specific historic resource survey form, recording detailed information about general characteristics, the presence of any outbuildings, stylistic influences, landscape, and structural details such as roof form, materials and plan, if possible. The surveyors will also record addresses as accurately as possible from neighboring properties or an approximate distance from cross streets or intersections if a street number is not visible. Surveyors will photograph each of the identified resources, including associated outbuildings, structures, and objects related to each property. Where access allows, all photographs will clearly depict architectural, engineering, and other details relevant to an evaluation of the resource's character defining details.

The information gathered in the investigations will be sufficient to analyze the integrity of each property and to make a preliminary determination of NRHP eligibility. If possible eligibility is affirmed, further information about potential visual impacts will be documented through photography, and in most cases, computer modeling. This approach will examine whether the top of any proposed transmission structure would be seen from a particular historic-age resource and if it could potentially impact the resource's viewshed. There are numerous methods and applications designed to calculate line of sight. As an initial study, architectural historians will first use a bare-earth digital model to determine if intervening topography between transmission structures and observation points would obscure the view and next use LiDAR imagery, where available, to review where existing vegetation may further obscure project or resource visibility. As outlined in the PA, an adverse effect to a viewshed or visual field is defined as any type of construction that changes any aspect of the design, location, workmanship, materiality, setting, feeling, and/or association of a property, thus affecting potential integrity and eligibility for NRHP listing. If architectural historians identify a potential adverse effect, then treatment plans will be developed as described in the PA.

The architectural historians will tabulate all historic resource information gathered during the fieldwork sessions to develop a resource identification list. The list will include site identification numbers, location information, property and subtype classifications, stylistic influences, construction dates, integrity issues and a preliminary recommendation regarding NRHP eligibility.

3.1.1.3 Tribal Involvement Protocols

In compliance with Section V.A.3 of the PA, Clean Line has voluntarily agreed to invite Tribal Monitors to participate in identification efforts in pre-designated high priority areas including initial survey, field investigations and mechanical excavation for archaeological deep testing. In 2015, the Muscogee (Creek) Nation, the Osage Nation, the United Keetoowah Band of Cherokee Indians of Oklahoma, the Chickasaw Nation, the Choctaw Nation of Oklahoma, and the Quapaw Tribe of Oklahoma provided to Clean Line maps designating certain high priority areas. These high priority areas are smaller than, but within, the Tribe or Nation's area of interest documented by maps provided to the DOE by the Tribe or Nation and appended to the PA. The maps and information regarding high priority areas are subject to confidentiality provisions in the PA.

The Osage Nation requested that all high priority areas designated by the Osage Nation THPO be surveyed one hundred (100) percent within the APE for direct effects. The Osage Nation also requested the opportunity to have Tribal monitors assist in the inventory process for specific high priority areas. The Osage Nation requested that if, for unusual circumstances, the high priority area or portions of it cannot be surveyed, then the Osage Nation would have the opportunity to have Tribal monitors present during ground-disturbing construction activities.

To facilitate Tribal Monitoring by the Tribes or Nations that provided high priority areas and that sign the PA as a Signatory or Invited Signatory, Clean Line will distribute relevant information about known identified archaeological sites in the respective Tribe's or Nation's designated high priority areas. Clean Line will provide the following: site boundaries to the extent known, site type, and basic descriptive or defining features to designated points of contact within each Tribe or Nation. Any such distribution of information will be subject to the confidentiality provisions in the PA.

Clean Line will make reasonable efforts to provide advance notice (by email or in writing) to the Tribe or Nation of forthcoming field investigation focused on their respective designated high priority areas; such notice will occur approximately 30 days prior to fieldwork. Such advance notice will include the approximate start date, county, and estimated days of survey required for the high priority areas being surveyed. Clean Line will make reasonable efforts to accommodate Tribal Monitor schedules. Clean Line will provide final notice (by email or in writing) no less than 14 calendar days prior to conducting field identification efforts in a Tribe's high priority area. This final notice will include the scheduled start date, survey crew coordinator's contact information, and an approximate schedule for fieldwork. When making advance and final notice, Clean Line will notify the designated and alternate points-of-contact listed in the PA, as appended. The Tribes may then choose to participate in fieldwork. Clean Line requests that Tribes or Nations confirm their intent to participate in identification (by email or in writing). Clean Line requests that Tribal Monitors make confirmation as early as possible, but no less than 7 days, in advance of the scheduled fieldwork by notifying (by email or in writing) the appropriate points of contact and the survey crew coordinator. Once confirmed, a survey crew coordinator will coordinate directly with the Tribal Monitor to make specific arrangements for fieldwork. The lack of a Tribe's or Nation's participation or lack of response to notice will not preclude Clean Line from proceeding with the identification efforts according to the schedule communicated in these notices.

Clean Line will contract directly with the Tribe or Nation and/or with an individual Tribal Monitor as a contract worker to arrange for reimbursement and compensation of services rendered. Such compensation will be at a reasonable market price for such services. Compensation by Clean Line will include consideration for Tribal Monitor's labor, personal protective equipment required, per diem, and reasonable expenses. Clean Line will execute Tribal monitoring agreement(s) at least thirty (30) days in advance of the inventory start date.

3.1.1.4 Inadvertent Discovery of Human Remains, Graves, and Funerary Objects

In the case of an inadvertent discovery of human remains, funerary objects, sacred objects or objects of cultural patrimony during cultural resources inventory or otherwise during implementation of this HPIP, Clean Line and Clean Line's consultants will implement the procedures under PA Section VII, "Inadvertent Discovery of Human Remains, Graves, or Associated Funerary Objects" and any additional applicable Discovery Plan in place for the project. If no additional Discovery Plan is in place at the time of discovery, the PA process will be considered to direct the complete course of action. Per the PA:

A. In the case of an unanticipated discovery of human remains, funerary objects, sacred objects or objects of cultural patrimony on Federal or Tribal lands, the applicable Federal agency or Tribe will follow the procedures outlined by NAGPRA (43 CFR Part 10, Subpart B) and the Archeological Resources Protection Act of 1979 (43 CFR Part 7 and 18 CFR Part 1312).

B. For cultural resource identification and during Project construction and restoration activities on non-Federal lands [state and private lands] in Oklahoma, Arkansas, Tennessee, or Texas, DOE will ensure Clean Line and their contractors involved in the discovery will implement the following procedures:

   1. If an unmarked human burial or unregistered grave is discovered, any Project personnel that detect the discovery must:

      a. Immediately stop Project work at the site of the discovery and all Project work within the exclusion zone;

      b. Immediately limit access to the exclusion zone according to the procedures described in the Discovery Plan [where in place];

      c. Implement notification procedures described in the Discovery Plan regarding unanticipated discovery;

d. Implement interim treatment measures to protect the discovery from weather, looting and vandalism, or other exposure to damages; and

e. In no case will procedures at this stage include removal or other further avoidable disturbance of any human remains or other cultural items in the immediate vicinity of the discovery.

2. As soon as practicable following receipt of such notification, Clean Line's or DOE's consulting cultural resource specialist(s) or monitor(s) will:

f. Inspect the work site to determine the extent of the discovery and ensure that work activities have halted within the exclusion zone;

g. Ensure that the exclusion zone is clearly and adequately marked and secured;

h. Implement interim treatment measures described in the Discovery Plan, as appropriate, to protect the discovery from weather, looting and vandalism, or other exposure to damages until the requirements of State law have been completed; and,

i. Notify the appropriate county sheriff's office, the Chief Medical Examiner, DOE, and Consulting Parties in accordance with the notification procedures described in the Discovery Plan within 48 hours of the discovery.

3. It is anticipated that the county coroner will determine jurisdiction. If the county coroner refers the matter to the SHPO, the SHPO and the State Archaeologist have 72 hours to determine, in consultation with the Consulting Parties, the treatment of the discovery. Treatment may include mitigation and determinations on the disposition of the unmarked human burial or unregistered grave. Clean Line will draft a Historic Properties Treatment Plan (HPTP) following the requirements of [PA] Stipulations V.B and V.D.

3.1.1.5 Data Collection and Curation

Secretary of Interior standards advise identification efforts to include explicit procedures for data keeping and integration of the information into preservation planning process (Standards I and II in Secretary of Interior Standard for Identification). Curation fulfills requirements of conserving the results of identification for future use and analysis.

To comply with these requirements, GIS will be the primary framework for the collection and organization of data. This system is an effective way of integrating the cultural resource information into Project design and coordination. A series of GIS data layers will link spatial data of all investigations, data recovered from the investigations (e.g., resource information), and temporal data (e.g., dates of investigation).

Surveyors will maintain data through digital and hard copy formats that can be duplicated and backed up in multiple secure off-site locations on a daily basis as a measure of risk management. Locational data of all investigations, findings, and relevant aspects of the landscape will be collected in accordance with Project protocols for GPS data and integrated into the GIS framework through shapefiles. State-specific standardized site forms, shovel test forms, and trench profile forms will be used to collect archaeological field data (See Section 5.0).

Surveyors will not collect artifacts unless required under the following criteria:

- State or federal regulations or policies require artifact collection.
- Collection is necessary as a result of the processes for identification, evaluating eligibility, or assessing potential for effect.

The policy of leaving artifacts onsite will keep site assemblages intact and avoid curatorial and ownership issues where private lands are involved. Any artifacts from federal lands will remain federal property and Clean Line will curate the collection at appropriate facilities. For artifacts collected in the field and available for curation at a qualified repository, including those from public state lands, Clean Line will prepare the materials for permanent storage, potentially at one of the following state facilities, which meet federal standards for curation (36 CFR 79):

- Museum of the Great Plains, Lawton, Oklahoma.
- Texas Archeological Research Laboratory, The University of Texas at Austin.
- The University of Arkansas Collections Facility, Fayetteville.
- Tennessee Division of Archaeology, Nashville (only curates collections from state-owned land). Curated materials from non-state-owned lands will be curated at an approved curatorial facility yet to be determined.
- Collection and curation policies vary by agency and state: Oklahoma guidance documents do not explicitly define a collection policy, but do contain curation requirements and protocols in the event materials are collected. The Oklahoma Antiquities Law (Oklahoma Statute Title 53 Chapter 20 [Section 361]) stipulates that all artifacts collected on state lands must be curated in an Oklahoma museum or repository.
- Tennessee standards and guidelines do not explicitly define a collection policy, but do contain curation requirements and protocols for the Tennessee Division of Archaeology, the authorized curatorial facility for artifacts on state lands.
- In Arkansas, collection of artifacts from the surface of each site is required (except items in funerary contexts). This stipulation is contingent on having landowner permission or a federal ARPA permit. The collection strategy and the kinds and numbers of artifacts collected will depend upon the size of the site, the number and diversity of artifacts, the research goals, and the timeframe of the project. The collected artifacts would be curated in the state-approved curation facility designated above. Arkansas guidelines state that observation and recording of artifacts without collecting is not an acceptable practice. Collections of material from sites known to be less than 50 years old are not necessary, although the nature of the artifacts observed should be recorded. Sampling strategies can be developed in accordance with nature of the site assemblage, namely the size and diversity of artifact classes.
- The Texas Historical Commission and Council of Texas Archeologists survey standards stipulate that all field notes, photographs and artifacts, if collected, must be curated in accordance with the *Guidelines and Standards for Curation.* The survey standards provide no specific collection policy.

Depending on the nature of the collection and region of origin, other curation repositories meeting federal curation standards may be used as agreed upon by DOE in consultation with Consulting Parties to the PA and other parties as appropriate. Should Tribal lands occur in the APE, the applicable Tribal government would further be consulted (through the Bureau of Indian Affairs or DOE as appropriate) on permitting, inventory methods, and collection/curation procedures on those lands. Collection of materials on tribal lands would be pursuant to ARPA permitting and custody of materials and notice procedures for discovery on tribal lands would follow 25 CFR 262.4-8.

4.0 Resource Recording and Reporting

4.1.1 Resource Documentation

In accordance with the protocols defined in Section 3.1.1.2.2, archaeologists will complete the appropriate state archaeological site forms for all archaeological sites discovered or reassessed during the field survey and submit the forms to the respective state's institution for assignment of archaeological site numbers (trinomials). For all above-ground historic resources within the direct APE and resources that can be sufficiently accessed within the indirect APE, architectural historians will complete the appropriate state architectural forms. Surveyors will document important isolated finds with state isolated find records. All site maps will depict the datum, site boundary, features, tools, and collected artifacts in relation to the Project's boundaries. All discovered sites will be evaluated with regard to integrity and potential historical significance so that recommendations could be made for proper management (e.g., avoidance, non-avoidance, or further work).

4.1.2 State Documentation and Reporting Standards

Archaeologists will submit the results of their investigations in a report that follows federal and state standards and protocols for archaeological and architectural documentation, including both resource documentation and reports of investigations. Consistent with these standards, reports will include an abstract, introduction that describes the Project and potential effects, environmental context, cultural setting and previous research, research design and objectives, methods, results of identification and evaluation efforts, management recommendations, and conclusions. The reports will include rationale for levels of effort and descriptions of limitations or biases in the data that could affect evaluations. All shovel test and backhoe trench locations and findings will be included in the reports as data tables and in annotated maps. Upon completion of each draft comprehensive report describing the results and findings of the identification efforts, Clean Line will submit reports to DOE. In accordance with distribution and schedule protocols defined in the PA, DOE will lead subsequent coordination and consultation in accordance with the Section 106 process.

5.0 Determinations of Eligibility

5.1 National Register of Historic Places (NRHP) Criteria

The DOE in consultation with the Consulting Parties to the PA will determine eligibility and significance pursuant to applicable NRHP regulations and criteria found in 36 CFR 60 and 36 CFR 63. Disputes regarding NRHP eligibility will be resolved by the Keeper of the National Register. *Guidelines for Applying the National Register Criteria for Evaluation* (National Register Bulletin #15) provides guidance in application of criteria. As stated in 36 CFR 60.4:

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and
>
> (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) that are associated with the lives of persons significant in our past; or

(c) that embody distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(d) that have yielded, or may be likely to yield, information important in prehistory or history.

5.2 State and Other Criteria

States typically defer to NRHP criteria in assessing significance. Oklahoma, Arkansas, and Tennessee do not have separate state criteria. For properties on public lands that fall beyond federal regulatory purview, Texas defines criteria for State Antiquities Landmarks (SALs) in Rules of Practice and Procedure for the Antiquities Code of Texas, Texas Administrative Code, Title 13, Chapter 26.10 through 26.12 and 26.19. Separate criteria are established for archaeological sites, shipwrecks, caches or collections, and historic structures. In addition to NRHP criteria, SAL criteria will be applied to cultural resources identified on public lands in Texas.

In consultation with Tribes, agencies, and other parties, DOE may put forth additional criteria for defining significance in cases such as resources of religious and traditional importance to consulting Tribes, National Historic Trails, and National Historic Landmarks.

6.0 Assessment of Potential Effects

The FEIS for the project describes potential Project impacts that could affect cultural resources anywhere within the APE (DOE 2015). Consistent with FEIS analysis, the characteristics of specific cultural resources fundamentally affect their susceptibility to different types of potential Project impacts. The assessment of potential effects will primarily focus on potential direct, physical impacts and on potential visual impacts, because these two types of impacts are the most likely to affect the kinds of cultural resources that likely occur (DOE 2015:3.9-31).

On this basis, effects to historic properties will be assessed foremost based on site vulnerability to ground-disturbing activities that may alter archaeologically meaningful spatial relationships of cultural materials and site contexts (DOE 2015:3.9-31) important to maintaining the integrity and NRHP eligibility of a site. Ground disturbing activities at archaeological sites would be assessed regarding the type and depth of the activity in relation to archaeological contexts, and the character of the archaeology at the site. Types of ground disturbing activities with potential to effect archaeological sites, as addressed in the FEIS (DOE 2015), are presented below.

Regarding above-ground historic buildings and structures, the project would typically avoid these sites and direct effects, such as the alteration or removal of buildings and other existing elements of the built environment (DOE 2015:3.9-31). Instead, such cultural resources may be impacted by the introduction of non-historical visual or, potentially, auditory elements into their setting (DOE 2015:3.9-31). Occasionally, an archaeological site's relationship to its surrounding environment is also an essential characteristic that contributes fundamentally to the site's significance, and in these instances, the site may also be subject to visual impacts from a project (DOE 2015:3.9-31). In these cases, for cultural resources that are eligible for listing in the NRHP, visual impacts might constitute an adverse effect under CFR 800.5(a)(2)(v) (DOE 2015:3.9-31). Introduction of structures such as the proposed transmission line and associated towers into an otherwise rural or natural setting could diminish the integrity of a property's significant historic features (DOE 2015:3.9-31-32). Assessment of effects (including visual effects) on historic properties is based in part on the evaluation of historic integrity (per National Register Bulletin 15) (DOE 2015:3.9-32). Visual and similar effects that may occur to the integral setting, association or feeling of NRHP-eligible cultural resources are assessed through identifying potential effects to the existing setting of a site and character-defining site aspects. Determinations and treatments of adverse effects will follow protocols defined in Section V.B of the PA.

As stated in the FEIS (DOE 2015:3.9-32), historic properties of particular interest to Indian Tribes are varied in their characteristics and could be subject to direct physical disturbances or to disturbances resulting from alteration of the visual surroundings, auditory field, or other characteristics of their setting. Tribes are consulted by DOE and under the PA regarding considerations of effects to these properties.

The FEIS describes the following examples of potential effects:

- A wide range of activities associated with the construction of the Project has the potential to result in extensive ground disturbance. From the point of view of archaeological resources, Project-related ground disturbance is the alteration of the structure, composition, and/or texture of the soil and its contents from the air-ground interface to depth in excess of that which would occur in absence of Project activities. Such impacts may occur as a result of earth moving (cutting, filling, grading, foundation preparation, sub-roadbed construction, and similar construction activities) or movements of equipment and vehicles over unprotected ground surfaces. If such ground disturbance results in physical or visual impacts to historic properties that are eligible for listing in the NRHP, such impacts could constitute an adverse effect under

36 CFR 800.5(a)(1), and, therefore, would require consultation with Consulting Parties to attempt to avoid, minimize, or mitigate adverse effects.

- Construction could also cause temporary impacts to cultural resources through the generation of dust, noise, and vibration, but such effects would be transient in nature.
- Assuming that demolition of existing buildings, structures, and sites such as marked historic cemeteries would be avoided during construction, the effects of constructing the Project would be transient and limited, and could include such temporary alterations of the environment as increased noise, vibration, and dust. Because of their transient nature, such effects would not usually require mitigation in relation to cultural resources.
- Wooded terrain requires more ground disturbance because of the need to clear transmission line corridors and build roads, among other activities, but woodlands may also present possibilities for vegetative screening of nearby historic standing structures. Open terrain tends to reduce the need for extensive construction disturbances outside transmission towers and other ground-level facilities. At the same time, open terrain also somewhat increases the potential for adverse visual effects to historic standing structures in close proximity to the Project alignment resulting from the introduction of transmission towers and other facilities…
- In general, impacts to Tribal resources would be similar to those that might occur to archaeological sites and historic architectural properties as described above. (DOE 2015:32-33).

7.0 Permits

State or federal regulations establish permit requirements, which are typically triggered by land jurisdiction or resource type (e.g. burials or funerary contexts). Prior to entering the field, Clean Line or its contractors will obtain necessary permits, if any, for those jurisdictions or resource type(s) that require such permits.

7.1 Archeological Resources Protection Act Permitting

The Archeological Resources Protection Act (ARPA) with its implementing regulations (36 CFR 296) requires permits for the treatment of archaeological resources on federal or Tribal land. Additionally, federal agencies may require either notification or permits for work conducted within their land jurisdictions.

For inventories on lands held by Tribes, special conditions (such as no photography) may pertain, and Clean Line will obtain additional permission to address the conditions. Any collection of materials on tribal lands would be pursuant to ARPA permitting and custody of materials and notice procedures for discovery on tribal lands would follow 25 CFR 262.4-8.

7.2 State Permits

7.2.1 Oklahoma

Per requirement of the Oklahoma Antiquities Law (Statute Chapter 20, Section 361) permits issued by the Oklahoma Archeological Survey are required for cultural resources investigations on state lands.

7.2.2 Arkansas

The Arkansas State Antiquities Act and Grave Protection Act (codified within Arkansas Code at Title 13 “Libraries, Archives, and Cultural Resources”) requires Arkansas Archeological Survey permits for excavations; a permit from the Arkansas Historic Preservation Program is required for excavation of burials.

7.2.3 Tennessee

All archaeological work on state-owned lands, or lands proposed for state acquisition requires a State Archaeological Permit issued by the State Archaeologist as required by the Tennessee “Archaeology” Code (Title 11, Chapter 6). The Code also requires a permit for excavation of burials and funerary contexts.

7.2.4 Texas

Antiquities Code of Texas (Title 9, Chapter 191) requires that all archaeological work on lands owned by the state or its political subdivisions shall be conducted under a State Antiquities Permit if the work will involve five or more acres of ground disturbance; 5,000 or more cubic yards of earth moving; will occur in a historic district; or will affect a recorded archaeological site.

8.0 Research Designs

Research designs integrate the results of the archival review, field methodology, and historic contexts. Prior to conducting field investigations and in consultation with DOE and the National Park Service under the PA, research designs will be completed for the federally designated Route 66 Preservation Corridor and the Trail of Tears National Historic Trail. The designs will define known concerns and probabilities, specific research problems or contexts to which each pertains, and appropriate methodologies for identification.

Research designs will include the following:

1. Objectives of the identification activities to characterize the range of historic properties in a region; to identify the number of properties associated with a context; to gather information to determine which properties in an area are significant.
2. Methods that will be used to obtain the information. The designs will clearly and specifically relate archival research, field survey, and other research methods to research problems. Archival research or survey methods will be presented in a manner that defines how the information was obtained and what its limitations or biases. The methods will be tailored to the kinds of properties most likely to be present in the area.
3. The expected results and the reason for those expectations. Expectations about the kind, number, location, character and condition of historic properties are based on a combination of background research, proposed hypotheses, and analogy to the kinds of properties known to exist in areas of similar environment or history.

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